Rhodora

JOURNAL OF THE

NEW ENGLAND BOTANICAL CLUB

Conducted and published for the Club, by

MERRITT LYNDON FERNALD, Editor-in-Chief

CHARLES ALFRED WEATHERBY
ALBERT FREDERICK HILL
STUART KIMBALL HARRIS
} Associate Editors

VOLUME 48

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The New England Botanical Club, Inc.
8 and 10 West King St., Lancaster, Pa.
Botanical Museum, Oxford St., Cambridge 38, Mass.

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Vol. 48. January, 1946. No. 565.

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Gray Herbarium of Harvard University, Cambridge 38, Mass.

H pl. 993, 994

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JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 48. January, 1946. No. 565.

SOME MOSSES FROM WINDSOR, NOVA SCOTIA

HERBERT HABEEB

THE following is a list of noteworthy mosses gathered in the immediate vicinity of Windsor, N. S. The writer collected 250 numbers of moss comprising 100 species. The collections were made in the spring of 1942.

In company with Prof. J. S. Erskine, many an afternoon free from duties was spent roaming the fields and woods neighboring on King's Collegiate School at Windsor, N. S. Prof. Erskine devoted himself to observing birds and flowering plants, while the writer took on the mosses.

The first noteworthy collector of Nova Scotia mosses was A. Menzies, who collected the type of *Dicranum fulvum* Hook. near Halifax; others were J. Fowler, A. H. MacKay, J. Macoun and G. E. Nichols. Of present day writers, E. B. Bartram[1] has published an article on Nova Scotia mosses; while Margaret S. Brown[2] has put out quite a complete list of Nova Scotia bryophytes.

Of the mosses here listed many are new to Nova Scotia, and some may be said to be coastal plain elements. The nomenclature used in this article is according to Grout.[3] The writer is grateful to Dr. A. J. Grout for the helping hand often lent in the determination of critical specimens.

AULACOMNIUM PALUSTRE (Web. & Mohr) Schwaegr. var. IMBRICATUM Bry. Eur. On ground, and humus.

[1] Bartram, E. B. Some Nova Scotia Mosses. RHODORA, **24**: 121–124. 1922.

[2] Brown, M. S. Liverworts and Mosses of Nova Scotia. Proc. N. S. Inst. of Sc. **19**: 161–198. 1936.

[3] Grout, A. J. List of Mosses of North America North of Mexico. The Bryologist, **43**: 117–131. 1940.

Plants referable to this variety are not uncommon in the Acadian region, as the writer has also a number of specimens from New Brunswick. Yet, it should be noted that some plants seem to posses leaves of both the variety and species.

DICRANUM SCOPARIUM Hedw. var. ORTHOPHYLLUM Brid. On ground. This is the form with the straight, strict leaves.

DICRANUM FUSCESCENS Turn. Common on ground in the woods.

DITRICHUM PALLIDUM (Hedw.) Hampe. Two collections from Windsor, off the ground.

PLEURIDIUM SUBULATUM (Hedw.) Lindb. On rather sterile ground. This moss was determined by Dr. Grout.

GRIMMIA ALPICOLA Hedw. On rocks, and boulders.

The writer has a suspicion that *Grimmia alpicola* is nothing more than a short-capsuled, muticous-leaved form of *Grimmia apocarpa* Hedw.

AMBLYSTEGIUM JURATZKANUM Schimp. On a rock.

BRACHYTHECIUM ACUTUM (Mitt.) Sull. On ground, and rotten wood.

BRACHYTHECIUM BESTII Grout. On ground in woods.

This moss is rather common in the Acadian region.

BRACHYTHECIUM CAMPESTRE Bry. Eur. On ground.

BRACHYTHECIUM FLEXICAULE Ren. & Card. On partly burnt wood, and ground.

BRACHYTHECIUM POPULEUM (Hedw.) Bry. Eur. On rocks, ground.

In both Nova Scotia and New Brunswick, *Brachythecium populeum* breaks down into two forms. One form is typical with a percurrent costa in the leaves, while the other has a costa extending ⅔ the length of the leaf.

BRACHYTHECIUM VELUTINUM (Hedw.) Bry. Eur. On ground, debris, and lower trunk of a tree.

BRYHNIA HULTENII Bartr. Was mixed with *Brachythecium rivulare* on debris in a damp situation. The determination was made by Dr. Grout, who mentions it as one of only a few collections.

AMBLYSTEGIUM VARIUM (Hedw.) Lindb. var. OVATUM Grout. Concerning this specimen Dr. Grout wrote "costa even shorter than in type".

DREPANOCLADUS ADUNCUS (Hedw.) Warnst. var. KNEIFFI (Bry. Eur.) Warnst. Two collections were made from the water

of a swamp. The one of May, 1942, is a large form. The other of April, 1942, is a small form.

DREPANOCLADUS ADUNCUS var. CAPILLIFOLIUS (Warnst.) Wynne. In water of a swamp.

EURHYNCHIUM HIANS (Hedw.) J. & S. A half dozen numbers collected from the ground, rotten log in a swamp, wood debris, etc.

A variable moss; a couple of specimens seem to approach the European *Eurhynchium Swartzii* (Turn.) Hobk. in leaf outline.

EURHYNCHIUM STRIGOSUM (Hoffm.) Bry. Eur. var. ROBUSTUM Röll. On ground.

HYGROAMBLYSTEGIUM IRRIGUUM (Wils.) Loeske. Not uncommon on debris in damp situations and alongside of brooks.

HYLOCOMIUM BREVIROSTRE (Beauv.) Bry. Eur. On rocks, brookside, and swampy ground.

HYPNUM CURVIFOLIUM Hedw. One collection made in April from the ground.

LEPTODICTYUM RIPARIUM (Hedw.) Warnst. This is mixed with its forma *longifolium* (Schultz) Grout; from turf and sticks, edge of a wet situation.

PLAGIOTHECIUM LAETUM Bry. Eur. On rocks, rotten wood.

ORTHOTRICHUM SORDIDUM Lesq. & James. On tree trunks, ironwood and maple.

ORTHOTRICHUM SPECIOSUM Nees. On old willow log.

The writer has collected good *Orthotrichum elegans* Hook. & Grev. in New Brunswick, but this collection from Winsdor seems to be closer to *O. speciosum* in its larger size and shaggier appearance. Some leaves are as long as 6 mm.

POLYTRICHUM COMMUNE Hedw. var. PERIGONIALE (Mx.) Bry. Eur. On ground, rotten logs, etc.

More common than the species in the Acadian region.

POLYTRICHUM JUNIPERINUM Hedw. var. ALPESTRE Bry. Eur. This form with the slender strict habit and shorter capsules is found around Windsor in boggy situations.

POLYTRICHUM FORMOSUM Hedw. On ground, May.

ASTOMUM MUHLENBERGIANUM (Sw.) Grout. On ground in rather sterile pasture.

PHASCUM CUSPIDATUM [Schreb.] Hedw. On ground in sterile pasture. This is typical and not the var. *americanum* Ren. & Card.

WEISIA MICROSTOMA (Hedw.) C. Müell. On ground, sterile pasture. *Weisia microstoma* when in fruit is easily separated from *Weisia viridula* Hedw.

Astomum Muhlenbergianum, *Phascum cuspidatum* and *Weisia microstoma* were found growing in association with each other, and sometimes with *Pottia truncata* (Hedw.) Furnr. These three species may have a coastal-plain distribution, at least in eastern Canada. For the writer has not as yet found them in central New Brunswick.

GRAND FALLS,
NEW BRUNSWICK

CYPRIPEDIUM CALCEOLUS L., var. **parviflorum** (Salisb.), comb. nov. *C. Calceolus*, β. in part, L. Sp. Pl. 951 (1753). *C. parviflorum* Salisb. in Trans. Linn. Soc. i. 77, t. 2, fig. 2 (1791). *C. flavescens* DC., B. *C. parviflorum* (Salisb.) DC. in Redouté, Liliaceae, i. pl. 20 (1802). *C. luteum* Raf., var. *parviflorum* (Salisb.) Raf. Med. Bot. i. 142 (1828). *C. hirsutum* Mill., var. *parviflorum* (Salisb.) Rolfe in Orchid Rev. xv. 184 (1907). *C. bulbosum* Mill., var. *parviflorum* (Salisb.) Farwell in Fifteenth Rep. Mich. Acad. Sci. 170 (1913). *Calceolus parviflorus* (Salisb.) Nieuwl. in Am. Midl. Nat. iii. 118 (1913).

The large-flowered *Cypripedium Calceolus*, var. *pubescens* (Willd.) Correll in Bot. Mus. Lfts. (Harvard), vii. 14 (1938) is relatively southern, characteristic of rich and dry to merely damp woodland from Georgia to Missouri, thence north to the Northern States, reaching its northeastern limit in central Maine. The smaller-flowered var. *parviflorum*, on the other hand, is relatively northern, extending from the southern part of the Labrador Peninsula to northern British Columbia, thence south to Newfoundland, Prince Edward Island, New Brunswick, New England, New Jersey, upland of Maryland, mountain-region to Georgia and Tennessee, Ohio, Indiana, Illinois, Missouri, New Mexico, Utah and Washington, mostly in calcareous bogs or mossy swamps or mossy woods or on wet rocks, slopes or shores. The differences between the two are clearly brought out by Mr. Albert M. Fuller in his masterly Studies on the Flora of Wisconsin I. The Orchids, Orchidaceae—Bull. Pub. Mus. Milwaukee, xiv[1]. 64–70 (1933), a treatment meriting careful consideration.—M. L. FERNALD.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. Fernald

(Plates 993–1020)[1]

I. Some Species in Rafinesque's "Herbarium Rafinesquianum"

(Plates 993 and 994)

Dr. Merrill has asked me about the identities of some of the species published in the rare work of Rafinesque, his Herbarium Rafinesquianum (1833). Unlike too many of the publications of that highly variable and temperamental genius, this little book is carefully written, with logical discussions and with diagnoses of genera and species actually in hand, specimens of which were offered for sale. What a pity that we cannot now buy the series! Here are many well described novelties from many parts of North America, many of which have clear priority over the descriptions of others. For the most part their identification can safely be made only by those intimately familiar with the areas concerned: Texas, Oregon, etc.; but in checking on the region I best know it has been found that several of our long-familiar specific names must lapse, while some in other sections of the world are obviously later homonyms. In the following memoranda only those names about which I feel no doubt are noted; others of them must be considered by specialists on other floras.

Spiranthes lacera (Raf.) Raf. Herb. Raf. 44 (1833). *Neottia lacera* Raf. Fl. Ludovic. 171 (1817), *nomen*, and in Am. Month. Mag. Crit. Rev. ii. 206 (1818) with full description. *Neottia gracilis*, var. β. *secunda* Bigel. Fl. Bost. ed. 2: 322 (1824).

S. montana Raf. Herb. Raf. 45 (1833). *S. ovalis* Lindl. Gen. Sp. Orch. Pl. 466 (1840). *S. cernua*, var. *parviflora* Chapm. Fl. So. U. S., ed. 3: 448 (1897). *Gyrostachys parviflora* (Chapm.) Small, Fl. Se. U. S. 318 (1903). *S. parviflora* (Chapm.) Ames, Orchidaceae, fasc. 1: 137 (1905). *Ibidium ovale* (Lindl.) House

[1] The cost of preparing and engraving the plates met in part through grants from the American Philosophical Society and from the Department of Biology of Harvard University.

in Muhlenbergia, i. 128 (1906). *I. parviflorum* (Chapm.) Jennings in Ann. Carneg. Mus. iii. 485 (1906). *Triorchis ovalis* (Lindl.) Nieuwland in Am. Midl. Nat. iii. 123 (1913). *S. Smallii* Schlechter in Beih. Bot. Centralbl. xxxvii². 358 (1920).

S. TUBEROSA Raf. Herb. Raf. 45 (1833). *S. Beckii* Lindl. Gen. Sp. Orch. Pl. 472 (1840), at least as to descr. *S. simplex* Gray, Man. ed. 5: 506 (1867), not Griseb. *Gyrostachys simplex* (Gray) Ktze. Rev. Gen. ii. 664 (1891). *S. Grayi* Ames in RHODORA, vi. 44 (1904). *Gyrostachys Grayi* (Ames) Britton, Man. ed. 2: 300 (1905). *Ibidium Beckii* (Lindl.) House in Muhlenbergia, i. 128 (1906). *Gyrostachys Beckii* (Lindl.) W. Stone, Pl. So. N. J. 375 (1912). *Triorchis Grayi* (Ames) Nieuwland in Am. Midl. Nat. iii. 123 (1913). *Triorchis Beckii* (Lindl.) House in Am. Midl. Nat. iv. 206 (1920).

Unfortunately, the original description of *Neottia lacera* Raf. in Am. Month. Mag. Crit. Rev. ii. 206 (1818) did not get into Index Kewensis, although the other species, described in the same column of the identical page and directly preceding it, was there entered; and this first specific name of the pair, *Neottia plantaginea* Raf. l. c., was taken up by Torrey as the basis of *Spiranthes plantaginea* (Raf.) Torr. (1843) and, since Torrey had taken it up and it, therefore, got into reputable literature, it has been the nomenclatural basis of binomials by Britton, House and Nieuwland. But *Neottia lacera*, described with it and again in Herbarium Rafinesquianum, has been quite ignored, as have the other eight names under *Spiranthes* in the latter work. Nevertheless *Spiranthes lacera*, based on *Neottia lacera* (1818), was several years earlier than *Neottia gracilis* Bigelow, Fl. Bost. ed. 2: 322 (1824), the nomenclatural basis of *S. gracilis* (Bigelow) Beck, Bot. 333 (1833). Bigelow's original account was as follows:

*NEOTTIA GRACILIS. *Slender Neottia.*

N. foliis radicalibus ovatis; scapo vaginato, floribus spiraliter secundis; labello obovato, crispo.

Leaves radical, ovate; scape sheathing; flowers in a spiral row; lip obovate, curled.

Root fascicled. Leaves radical, on short petioles, ovate, acute, nerved, caducous. Scape erect, slender, eight to twelve inches high with a few sheathing scales or leaf[l]ets. Flowers white in a twisted spike. Bractes closely applied to the germ, ovate, acuminate. Germs obovate. Petals linear, crystalline, parallel, the three upper ones cohering. Lip obovate-spatulate, curled, its base swelling with the lateral petals connected before it. Anther parallel to the style.—In dry, hilly woods.—July.—Perennial.

The leaves falling off frequently cause the plant to appear leafless at the time of flowering.

Variety β. secunda. Spike unilateral, hardly twisted; flowers more slender. Perhaps a different species.—In Conway, New-Hampshire.—July.

Rafinesque's original description in the American Monthly Magazine and Critical Review was

> 24. *Neottia lacera* Raf. Smooth radical leaves oblong obtuse flat, scapes vaginated, sheaths acute: spike slender, flowers one sided spiral nodding, bracteas longer than the ovary, labellum canaliculated reflexed obtuse laciniated.—Obs. Detected in 1816, in the swampy woods, near Glen's Fall's, Lake George, and the Luzerne mountains, blossoming in July and August, flowers white, scape slender about one foot high, root palmated.

Rafinesque's second account, in his Herbarium Rafinesquianum (1833), was briefer but contained the synonym "N [*i. e. S*]. *gracilis*, Beck, 1833", which nomenclaturally rested on *Neottia gracilis* Bigel. and, incidentally, indicated the priority in 1833 of Beck over Herbarium Rafinesquianum. From this it would be natural to infer that *Spiranthes gracilis* must give way to *S. lacera;* but in this case Rafinesque "builded better than he knew", just as Jacob Bigelow did when he separated as "Perhaps a different species" the more slender-flowered plant of the White Mountains.

Spiranthes gracilis, as generally interpreted, consists of two quite different species: one relatively southern, the true *S. gracilis*, i. e. *Neottia gracilis* Bigelow; the other relatively northern, the *Neottia lacera* Raf. (1818), or *N. gracilis*, var. β. *secunda* Bigelow (1824), the *S. lacera* (Raf.) Raf. (1833). Study of all the material in the Gray Herbarium, the Ames Herbarium, the herbarium of the New England Botanical Club and that of the New York State Museum, which has been kindly placed at my disposal by Dr. House, brings out several striking differences. Some of these are shown in PLATES 993 and 994. They may be briefly stated as follows[1]:

[1] SPIRANTHES LACERA (as *S. gracilis*) is beautifully illustrated in that remarkably accurate study of orchids, by Albert M. Fuller, with photographs by George L. Waite, Studies on the Flora of Wisconsin Part *1:* The Orchids; Orchidaceae—Bull. Pub. Mus. Milwaukee, xiv. no. 1, pl. 36 (1933). This plate well displays *S. lacera.* Although Mr. Fuller conservatively followed long-established usage, he obviously saw two elements in his *S. gracilis*, saying (p. 113): "While the flowers usually occur in spirals on the raceme, plants with distinctly 1–sided (secund) racemes appear to be plentiful in northern Wisconsin". If the Milwaukee Museum has more such careful "Studies" we shall all welcome them.

SPIRANTHES LACERA (PLATE 993): basal leaves usually present at flowering time, though often wilted, submembranaceous, semi-translucent, the veins and veinlets clearly evident, the veinlets simple or subsimple, forming an obvious loose mesh; spike secund or with 1–few spirals, the flowers distant in few elongate series; sepals and petals narrowly lanceolate to lance-linear, forming a slender tube 1–1.75 (rarely –2.25), averaging 1.4 mm., in diameter, much longer than thick and not strongly ringent; dilated summit of lip drooping, with a broad white border.—Very dry to moist acid open (rarely shaded) soil, Magdalen Islands to Manitoba, south to Nova Scotia, New England, Long Island, more rarely to southeastern Virginia, upland to North Carolina (up to 3300 ft.) and Tennessee, southern Ontario, Michigan, northern Illinois, Wisconsin and Minnesota. Flowering from June 15 to September 11 (AVERAGE of 135 collections AUGUST 5).

S. GRACILIS (PLATE 994): basal leaves rarely present at flowering time (though occasionally on non-flowering younger plants), thick, opaque, the veinlets barely visible by strong transmitted light, more branched and forming an obscure but relatively fine mesh; spike strongly spiraling, the approximate flowers in many short secund series; tube of perianth more ringent, the bases of the broader sepals and petals forming a tube 1.5–2.5, averaging 2 mm., thick; white border of summit of lip narrower.—Dry to moist open soil, or in open woods and thickets, Florida to Texas, north to southwestern Maine, southeastern New Hampshire, central Vermont, southeastern, central and western New York, Ohio, Indiana, Illinois, Missouri and Oklahoma. Flowering late July to October (AVERAGE of 110 collections SEPTEMBER 2).

All material seen from Quebec, New Brunswick, Nova Scotia, northern and central Maine and New Hampshire, northern Vermont, northeastern New York, Ontario, Michigan, Wisconsin, Minnesota and Manitoba belongs to *S. lacera*. In eastern New York that plant abounds northward, being the only one of the two species found in the Adirondack region and near Lake George, from Clinton and St. Lawrence Counties to Saratoga, Fulton and Oneida Counties, while in Cattaraugus County to the west it occurs at an altitude of 2000 feet. It is the plant of shores and slopes near Lake George (our FIG. 2) and is clearly the plant described by Rafinesque from there.

Spiranthes gracilis, of wide southern range, spreads northward at low altitudes to Cumberland County, Maine, Strafford and Hillsboro Counties, New Hampshire, southeastern Addison County, Vermont, and in eastern New York from Long Island northward to Albany County. In southern New England and southern and central New York both species occur. It is, therefore, specially illuminating to note the collector's data when they have placed them both on one sheet or under the same label. Thus, the late Charles W. Jenks, getting them both in Bedford, Massachusetts, and calling them both *S. gracilis*, noted them on his label and sheet as *a*, *b* and *c; a* being flowering *S. lacera* collected July 26, *b* fruiting material of the same collected August 24,

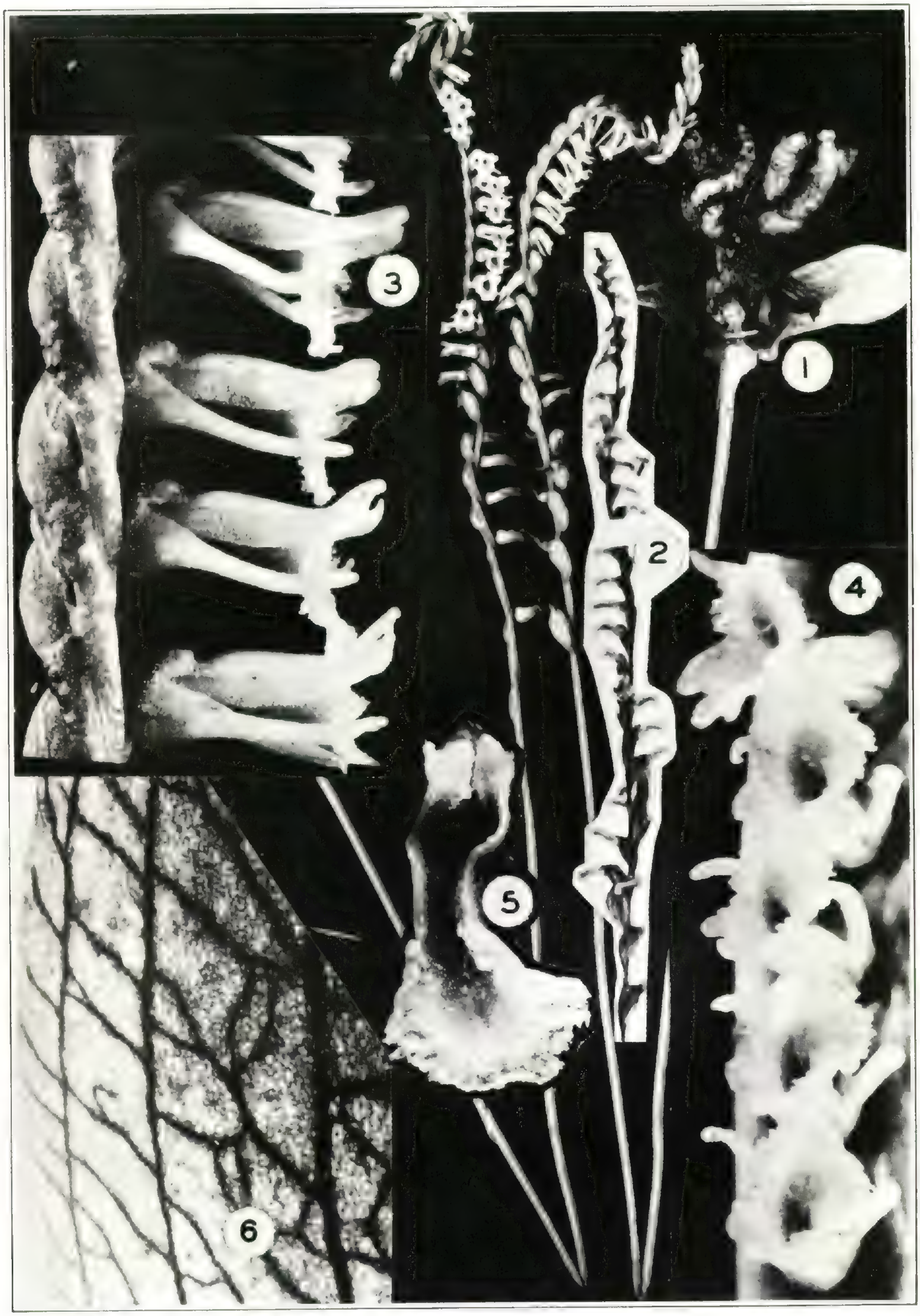

Photo. B. G. Schubert

SPIRANTHES LACERA: FIG. 1, two plants, × 1, from type-region of *S. gracilis*, var. *secunda;* FIG. 2, two spikes, × 1, from type-region of species; FIG. 3, profile, × 6, of portion of spike; FIG. 4, face-view, × 6, of same flowers; FIG. 5, lip, × 10; FIG. 6, venation of basal leaf, × 10, by transmitted light.

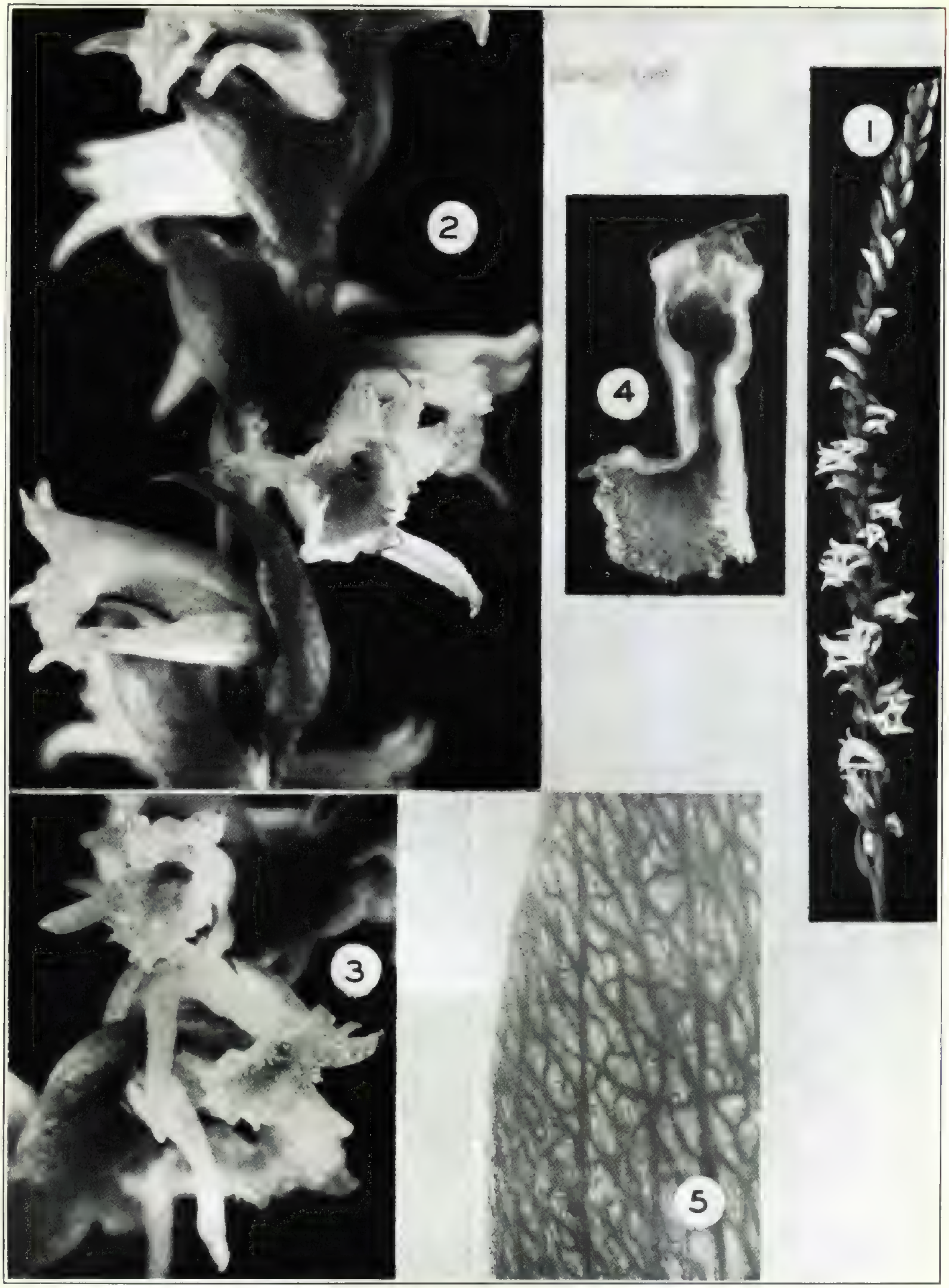

Photo. B. G. Schubert

SPIRANTHES GRACILIS: FIG. 1, spike, × 1, from type-region; FIG. 2, profile, × 6, of flowers, and FIG. 3, face-view, × 6, of flowers; FIG. 4, lip, × 10; FIG. 5, venation of basal leaf, × 10, by transmitted light.

and *c* young flowering material (the upper half of the spike in bud) of *S. gracilis* collected August 25. Another sheet from Massachusetts, from the herbarium of H. M. Ballou, has the two under one label, the slender-flowered *S. lacera* dated July 18, the flowering *S. gracilis* marked "Aug.". One other mixed sheet brings out the difference in flowering period. This is one of the late R. W. Woodward's beautiful sheets from Franklin, Connecticut, the label bearing the notes: "plants with basal leaves July 14", these being *S. lacera* in anthesis; "plants without basal leaves Aug. 11", these being *S. gracilis*, so young that the recurving budded tips have not straightened up.

Not only did Jacob Bigelow think that *Spiranthes lacera* (his *Neottia gracilis*, var. β. *secunda*) was "perhaps a different species"; Asa Gray, having material of it, probably from northern New York, was puzzled by it. His specimen resided for nearly a century in the Gray Herbarium, unnoticed in a pocket, pasted on a sheet of typical *S. gracilis*, but with a folded manuscript discussing its details and a significant "(?)" after the unsatisfactory name. Furthermore, I find that in both the Gray Herbarium and that of the New England Botanical Club a specialist on the *Orchidaceae* has recently separated out strikingly characteristic sheets of *S. lacera* and has annotated them as the very different *S. Beckii;* at least they did not seem to him to be *S. gracilis!*

There can be hardly a doubt of the identity of *Spiranthes montana* Raf. with the beautifully distinct *S. ovalis* Lindl. Rafinesque's description was brief but clear:

> 8. Sp. *montana*, Raf. Caule basi folioso, fol. radic. obl. cuneatis-obtusis, caulinis lanc obt. spicis obl. dense spir. bract. obt. acum. fl. mediocris, labellum obl. obt. erosum.—Cumberland mts. pedal. disc. 1823.

This species (as *S. ovalis*) has been collected by my companions and me several times in Virginia. Its cuneate-oblong or oblanceate, obtuse or acutish lower leaves, its well developed cauline leaf or leaves and the thick and short spike, tapering when young but rounded at summit at maturity, are characteristic, as is the lip. Although local, the species is scattered in rich, preferably calcareous woods from Virginia across the Cumberland Mts. and Plateau of Kentucky to bluffs of southern Indiana and to Mis-

souri, south to northern Florida, Alabama, Mississippi, Louisiana and eastern Texas. Dr. E. Lucy Braun records it from three counties of Kentucky in the Cumberland area and specimens from the Cumberland Mts. of Tennessee are well known.

As to the identity of *Spiranthes tuberosa* Raf. and the white-lipped *S. Beckii* Lindl. there is certainly no doubt. Here is the original diagnosis:

> 10. Sp. *tuberosa,* Raf. rad. tuberosa monorchis, caule filif. aphyllo, vaginis setaceis, spic. gracilis vix spiralis secunda, bract. brevis acutis, fl. parvis, labellum cuneato acuto.—Disc. by M. Durand in New Jersey, pedal.

This, with "rad. tuberosa monorchis", etc., is surely the characteristic species with a single tuberoid, described by Gray as *S. simplex:* "Root a *solitary oblong or spindle-shaped tuber;* no leaves at flowering time; scape 5′–9′ high, bearing a small narrow (rarely 1-sided) spike of *very short flowers* (perianth 1″–1½″ long) . . . —E. Mass. (Nantucket, *Dr. Robbins*), New Jersey (*C. F. Austin, &c.*) and Delaware, *Wm. M. Canby*".

HABENARIA MARITIMA Raf., Herb. Raf. 74 (1833) antedates by nearly 60 years the Californian *H. maritima* Greene, Pittonia, ii. 298 (1892), basis of *Piperia maritima* (Greene) Rydb. in Bull. Torr. Bot. Cl. xxviii. 641 (1901).

With only limited understanding of the Californian endemics I refrain from renaming the latter. By Ames it is treated as *H. elegans* (Lindl.) Bolander, var. *maritima* (Greene) Ames, Orchidaceae, iv. 113 (1910). It is noteworthy, however, that both Jepson and Abrams, with intimate field-acquaintance of both, maintain them as distinct.

Rafinesque's *Habenaria maritima* was obviously one of the numerous fluctuations of *H. clavellata* (Michx.) Spreng. (1826), which was based on *Orchis clavellata* Michx. Fl. Bor.-Am. ii. 155 (1803) from Carolina and which, in spite of the slightly 3-lobed tip of the lip was described by Michaux "cornu longitudine ovarii, clavato; labello ovali, integro". Rafinesque's description was quite as definite:

> 4 *Habenaria maritima,* Raf. Caule angulato, folia unica longa cuneata lanc. ceteris subulatis, Spica brevis paucifl. 5–8 fl. bract. lanc. ovar. eq. calcar recurvo clavato labello oblongo truncato.—On the Sea Islands of New Jersey in swamps, semipedal, flowers small greenish white.

Those who consider *Habenaria maritima* Greene a good species need a name for it.

CALIPOGON PARVIFLORUM Raf. Atl. Journ. i. 148 (1832).

Several years earlier than *Calopogon parviflorus* Lindl. Gen. Sp. Orch. Pl. 424 (1840), that species considered identical with *Ophrys barbata* Walt. Fl. Carol. 221 (1788), the basis of CALOPOGON BARBATUS (Walt.) Ames, Orchidaceae, ii. 227 (1908). Rafinesque's plant was evidently of this species, as indicated by his "stem one leaved 3–5 flore", for *C. barbatus* has 1–7 flowers, its var. *multiflorus* (Lindl.) Correll in Bot. Mus. Lfts. vii. 71 (1940), based on *C. multiflorus* Lindl. l. c. 425 (1840), having more. The only other species to consider for Rafinesque's species of "Fl. and Louis", with "3–5 . . . flowers spicate, minute, bracts subulate, labellum undulate", is *C. pallidus* Chapm. (1860). Originally described "Scape 10–20-flowered", that species, at the northern limit of its range, in southeastern Virginia and North Carolina, may, in the smaller specimens, have as few as 3–6 flowers. Until authentic material of Rafinesque's species is found, it is wisest to let *C. pallidus* stand; his specific epithet, however, clearly antedates that of Lindley.

GOODYERA OBLONGIFOLIA Raf. Herb. Raf. 76 (1833). *Spiranthes decipiens* Hook. Fl. Bor.-Am. ii. 203, t. 204 (1839). *G. Menziesii* Lindl. Gen. Sp. Orch. Pl. 492 (1840). *Orchioides decipiens* and *O. Menziesii* Ktze. Rev. Gen. ii. 675 (1891). *Peramium Menziesii* (Lindl.) Morong in Mem. Torr. Bot. Cl. v. 124 (1894). *Peramium decipiens* (Hook.) Piper in Contrib. U. S. Nat. Herb. xi. 208 (1906). *G. decipiens* (Hook.) F. T. Hubbard in Standardized Pl. Names, 328 (1923).

Rafinesque's description of *Goodyera oblongifolia* from the mountains of Oregon seems unequivocal:

10 *Goodyera seu Tussaca oblongifolia,* Raf. Fol. radic petiol oblongis ovatis acutis 5 nervis non reticulatis, subtus glaucis, caule gracile vaginato, spica laxiflora, fl. remotis hirsutis, bract. lanc. acut. ovar. eq. ovarium tereto.—Oregon mts. subpedal, fl. white small.

Hooker said "Scape 8 inches to a foot high"; Lindley's description of *Goodyera Menziesii*, "Hab. in *Americae septentrionalis* orâ occidentali, *Menzies, Douglas*", began:

"G. subacaulis, foliis oblongis venosis unicoloribus petiolis longioribus, spicâ laxâ . . . , bracteis ovario aequalibus".

There is little difference (except in finish) between this account of the habit of *G. Menziesii* and Rafinesque's definition of the earlier *G. oblongifolia.*

CORALLORHIZA MONTANA Raf., Herb. Raf. 75 (1833) should be added to the synonymy of *C. odontorhiza* (Willd.) Nutt. (1818), which was *Cymbidium odontorhizon* Willd. (1805). Rafinesque's species from the "Wasioto mts, and hills, autumnal" had the "labello involuto truncato . . . , capsulis pendulis globosis, . . . flowers small yellowish, with red spots on the lip". The small flowers, pendulous, globose capsule and autumnal flowering seem to settle the identity.

DENTARIA GRANDIFLORA Raf. Herb. Raf. 47 (1833). *D. macrocarpa* Nutt. ex Torr. & Gray, Fl. i. 88 (1838). *Cardamine pulcherrima* Greene in Erythea, i. 148 (1893). *D. macrocarpa,* var. *pulcherrima* (Greene) Robinson in Gray, Syn. Fl. i[1]. 154 (1895). *D. tenella* Pursh, var. *pulcherrima* (Greene) Detling in Am. Journ. Bot. xxiii. 273 (1936).

Rafinesque's description was clearly of the largest-flowered extreme which Greene later described as *Cardamine pulcherrima.* Rafinesque's account of his plant from Oregon follows:

2. *Dentaria grandiflora,* Raf, Caule flexuoso apice diphyllo, fol. oppos. petiolis alatis, trifoliatis, foliolis sessilib. ovato-lanceol, ineq. serratis, racemo brevis umbellato grandifloro.—Pedal. fl. incarnate one inch long. petals entire equal to stam.

SANGUISORBA' STIPULATA Raf., Herb. Raf. 47 (1833). *S. canadensis* L. β. *latifolia* Hook. Fl. Bor.-Am. i. 198 (1834). *S. sitchensis* C. A. Meyer, Fl. Ochot. 34 (1856). *Poterium sitchense* (C. A. Meyer) S. Watson, Bibl. Index, i. 303 (1878). *S. latifolia* (Hook.) Coville in Contrib. U. S. Nat. Herb. iii. 339 (1896).

Unfortunately the long-familiar name *Sanguisorba sitchensis* for the northwestern species must lapse. Rafinesque's description of his plant from Oregon was clear:

3. *Sanguisorba stipulata,* Raf. Caule apice panicul. angul. nudo, fol. amplis, foliolis stipulatis petiolatis alternis, cordatis ovatis grandident. spicis parvis obl. bract. ovatis acum.—Foliolis twice as large as in *S. officinalis,* 3 inches long.

Compare the description by Abrams of *Sanguisorba sitchensis:*

" . . . stipules rounded, coarsely toothed; leaflets oblong-ovate, 2–7 cm. long, rounded at the apex, cordate at the base, coarsely serrate, petiolulate", etc.

Explanation of Plates 993 and 994

Plate 993, Spiranthes lacera (Raf.) Raf.: fig. 1, two plants, × 1, from Randolph, Coös County, New Hampshire, *Pease*, no. 31,500; fig. 2, spike, × 1, from the type-region, Northwest Bay, Lake George, Warren County, New York, *House*, no. 30,076; fig. 3, profile of portion of spike, × 6, from no. 31,500; fig. 4, face-view, × 6, of portion of spike, from no. 31,500; fig. 5, lip, × 10, from no. 31,500; fig. 6, venation of basal leaf, × 10, by transmitted light, from Willoughby, Vermont, September 4, 1896, *G. G. Kennedy*.

Plate 994, S. gracilis (Bigelow) Beck: fig. 1, spike, × 1, from Wellesley, Massachusetts, August 17, 1945, *F. W. Hunnewell;* fig. 2, portion of spike, × 6, from same collection; fig. 3, face-view of portion of spike, × 6, from Winchester, Massachusetts, August 16, 1945, *Ernest Rouleau;* fig. 4, lip, × 10, from last specimen; fig. 5, venation of dried-out old basal leaf, × 10, by transmitted light, from East Hartford, Connecticut, *Weatherby*, no. 1434.

II. Difficulties in North American Salix

(Plates 995–1006)

1. Muhlenberg's Nordamerikanischen Weiden antedated by Michaux.—The first decade of the 19th century and the two decades immediately preceding it were of the greatest significance in making known the more generalized flora of eastern North America. Not appreciating the ultimate significance of the exact date of issue (like too many editors of so-called learned societies today), editors brought out scattered or independent papers under a blanketing title-page with one arbitrary date for the whole series. Something has been done to clarify the dates of actual publication of numerous debatable works and much more remains to be done, especially since the over-nice susceptibilities of librarians and book-binders have long led to the discarding of or the shifting of the positions of the original covers (and, of course, the trimming off of all carefully made marginal memoranda). In the intricate genus *Salix* one paper has been outstanding as containing the original descriptions and drawings of leaves of the commoner species of the eastern United States. This is the brief article entitled *Uber die Nordamerikanischen Weiden von Hrn. Pred.* Mühlenberg *mit Anmerkungen des Hrn. Prof.* Willdenow, which was article no. XIV (pp. 233–242, tab. VI) in Der Gesellschaft Naturforschender Freunde zu Berlin Neue Schriften, iv, with the general title-page dated 1803.

Since Michaux, in his Flora Boreali-Americana, ii. 225, 226 (1803), also published as new five species of *Salix* from Canada and the eastern United States the exact dates of issue of the two

nearly contemporaneous treatments have to be settled. To be sure, it has long, following Willdenow who had an editorial finger in the Muhlenberg paper, been assumed to need no investigation. In fact, so dominating was the influence of Willdenow and his remarkable and compendious Species Plantarum that the dictum emanating from those sources has rarely been challenged. Thus, the Muhlenberg treatment of American willows was reprinted by Konig and Sims in their Annals of Botany, ii. 62–69, pl. 5 (1805)[1] with the title: *On North American Willows, by the Rev. Mr.* MUHLENBERG, *with Notes of Professor* WILLDENOW. Furthermore, although Sims had been regularly citing Michaux, Flor. Bor.-Am. in his articles in Curtis's Botanical Magazine, beginning on December 1, 1803, so that it appears that he knew that remarkable work, he and Konig in 1805 contrived to overlook the five species of *Salix* published by Michaux, for, as an explanation of their reprinting of the Muhlenberg paper they wrote: "of all the species of these regions, we know but one through Mr. von Wangenheim [*S. conifera*, an abnormal plant] and another through Mr. Aiton [*S. tristis*]." Nevertheless, the five species of Michaux can hardly be waved aside; surely not if the sketchy accounts by Marshall are satisfactory for the establishment of three of our species!

My attention was drawn to this technical matter through noting, while studying Schneider's various papers on American willows, that in Journ. Arn. Arb. ii. 189 (1921) Schneider, without a word of explanation, reduced outright to *S. cordata* Muhlenberg (our PLATES 995 and 996) the utterly different *S. cordata* Michx. (our PLATES 997–1006); and, furthermore, that in vol. i. 158 (1920) he had reduced to *S. adenophylla* Hook. (our PLATE 997) the amazingly different *S. syrticola* Fernald (our PLATES 1001 and 1002). I was naturally surprised at what has been called "this Schneid. treatment" of these species, for I had studied Michaux's willows as well as Hooker's type of *S. adenophylla* (PLATE 997) and I knew that *S. cordata* Michx. has quite different aments from those of *S. cordata* Muhl.; in fact, that it is the best kind of *S. adenophylla!* And I also knew the several fundamental characters which distinguish *S. syrticola* from the others. It is,

[1] The title-page says 1806, but the late Mr. James Britten pointed out in Journ. Bot. xl. 419 (1902) that the pages including the Muhlenberg reprint were issued "1 June, 1805."

consequently, evident that the application of Schneider's apology should be extended quite to the Atlantic coast, for he gave it too occidental a bearing when he wrote, "As to the [§] *Cordatae*, I am not yet well enough acquainted with some of the western forms of this group to be able to draw a sharp line between them and the [§] *Adenophyllae*" (Journ. Arn. Arb. i. 148 (1920)).

Returning to the question of dates, Dr. Schubert, in RHODORA, xliv. 149 (1942), has clearly shown that Michaux's Flora Boreali-Americana was on sale in March, 1803. It was very soon being cited: for instance, Sims in Curtis's Botanical Magazine, xix, under plates 703, etc.; plate 703, of *Iris virginica* (with definite citation of "*Michaux* Flor. Bor.-Amer. 1. 22"), being engraved in time for publication on December 1, 1803. Nearer home, in Paris, in the 780-page (therefore not written in a day) vol. vi. (1804) of Lamarck's Encyclopédie Méthodique, Poiret added at the end of his treatment of *Salix* the note (p. 661): "Michaux, dans sa *Flore de l'Amérique septentrionale*, cite les espèces suivantes", followed by transcripts from Michaux and more detailed descriptions by Poiret. The actual placing on sale of Michaux's *Flora* in March, 1803, can hardly be questioned.

As to the Muhlenberg paper on *Nordamerikanischen Weiden* I have again asked the aid of Dr. Schubert. The following items are most important. The Vorrede of vol. iv. of Der Gesellschaft Naturforschender Freunde zu Berlin Neue Schriften, with the title-page dated 1803, certainly was prepared before the volume was actually published. This Foreword bears the definite date "Berlin, den 3ten Mai 1803", two months after Michaux's *Flora* was on sale. This concerns vol. iv. of the Neue Schriften.

In the Göttingische gelehrte Anzeigen, Bd. iii for 1803, p. 1493, issued "den 17. Sept. 1803", vol. iii of the Neue Schriften was reviewed; but it was not until Bd. i for 1804 of Gött. Anz. p. 255 ("16. Febr. 1804") that the first notice of Neue Schriften, iv appeared, while Muhlenberg's paper on Nordamerikanischen Weiden and succeeding papers in vol. iv were not reviewed until the issue of May 12, 1804. Another line of evidence is found in the dates of sending or receiving the manuscripts of articles published in vol. iv of Neue Schriften. The manuscript of article no. VI, by Domeier, was sent from "London, in December 1802" (p. 110); article no. XVIII, by Karsten, was dated "AM

15ten Marz 1803" (p. 328); article XXIII was submitted by Trommsdorf from "Erfurt, im Febuar 1803" (p. 391); while article XXIV, by Bode, was submitted from "Berlin, den 26sten April 1803" (p. 394). These dates are consistent with the interpretation derived from the first notice of vol. iv in the Göttingische gelehrte Anzeigen, "16. Febr. 1804". It is clear, then, that Michaux's Flora Boreali-Americana was on sale in March, 1803, but that Muhlenberg's paper on American Willows could not have been issued prior to the date of the foreword, May 3, 1803, and was probably not available until late in 1803 or early 1804.

Fortunately, in 1903 I made a detailed study of Michaux's Herbarium in Paris and made notes on or photographs of all types which were within my limited understanding. These have subsequently been supplemented by some hundreds of sharply clear photographs taken under the supervision of Metman by the photographer for the Muséum National d'Histoire Naturelle, Cintract, so that a fair proportion of Michaux's species are understood. Unhappily, however, in case of *Salix* only my memoranda and some very vague photographs of 1903 are available. These notes, nevertheless, were explicit, except for the one southern species which I then did not know.

(To be continued)

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H pl. 975-1004

Photo. B. G. Schubert

SALIX RIGIDA: FIG. 1, leaf of TYPE, × 1, after *Muhlenberg;* FIG. 2, fruiting branch, × 1; FIG. 3, portion of young pistillate ament, × 5; FIG. 4, fruiting ament, × ⅘; FIG. 5, portion of fruiting ament, × 5.

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NINTH REPORT OF THE COMMITTEE ON PLANT DISTRIBUTION

The present report deals with the tribes *Chlorideae*, *Festuceae* and *Hordeae* of the *Gramineae*, taken in the order of the seventh edition of Gray's Manual. This report completes the treatment of the *Gramineae* which has continued through two previous reports with which it has been prepared more or less concomitantly; acknowledgments there made apply equally here.

PRELIMINARY LISTS OF NEW ENGLAND PLANTS—XXXIV

The sign + indicates that an herbarium specimen has been seen: the sign − that a reliable printed record has been found.

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
I. Chlorideae						
Bouteloua curtipendula (Michx.) Torr.	+			+		+
Bouteloua gracilis (HBK.) Lag.	+			+		
Bouteloua radicosa (Fourn.) Griffiths	+			+		
Bouteloua rigidiseta (Steud.) Hitchc.	+			+		
Bouteloua simplex Lag.	+					
Chloris cucullata Bisch.	+					
Chloris virgata Swartz	+			+		
Cynodon dactylon (L.) Pers.				+		+
Dactyloctenium aegyptium (L.) Richter	+			+		
Eleusine indica (L.) Gaertn.				+	+	+
Leptochloa filiformis (Lam.) Beauv.				+		
Spartina alterniflora Loisel.	+	+		+	+	+
Spartina alterniflora var. pilosa (Merr.) Fern.	+	+		+	+	+
Spartina caespitosa A. A. Eaton	+	+		+	+	+
Spartina cynosuroides (L.) Roth				+		+
Spartina patens (Ait.) Muhl.	+	+		+	+	+
Spartina patens var. juncea (Michx.) Hitchc.	+	+		+	+	+

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
II. CHLORIDEAE—*Cont.*						
Spartina pectinata Link	+	+	+	+	+	+
Spartina pectinata var. Suttiei (Farwell) Fern.	+	+	+	+		+
II. FESTUCEAE						
Briza media L.			+	+		+
Briza minor L.	+		+	+	+	+
Bromus arvensis L.			+	+		+
Bromus brizaeformis Fisch. & May.			−	+		+
Bromus ciliatus L.	+	+	+	+	+	+
Bromus ciliatus var. intonsus Fern.	+	+	+	+	+	+
Bromus commutatus Schrad.	+			+	+	+
Bromus Dudleyi Fern.	+	+	+	+	+	+
Bromus erectus Huds.	+		+			+
Bromus inermis Leyss.	+	+	+	+		+
Bromus inermis f. aristatus (Schur.) Fern.	+			+		+
Bromus japonicus Thunb.				+		+
Bromus Kalmii Gray	+	+	+	+		+
Bromus latiglumis (Shear) Hitchc.	+	+	+	+		+
Bromus latiglumis f. incanus (Shear.) Fern.	+	+	+	+		+
Bromus marginatus Nees	+					+
Bromus marginatus var. seminudus Shear	+					
Bromus mollis L.	+			+	+	+
Bromus mollis f. leiostachys (Hartm.) Fern.						+
Bromus purgans L.		−	+	+	+	+
Bromus purgans f. glabriflorus Wieg.			−			+
Bromus purgans f. laevivaginatus Wieg.		+	+	+		+
Bromus racemosus L.	+		−	+	+	+
Bromus rigidus Roth var. Gussonii (Parl.) Coss. & Dur.				+		
Bromus rubens L.				+		
Bromus secalinus L.	+	+	+	+	+	+
Bromus sterilis L.				+	+	+
Bromus squarrosus L.						+
Bromus tectorum L.	+	+	+	+	+	+
Cynosurus cristatus L.	+	+	+	+	+	+
Dactylis glomerata L.	+	+	+	+	+	+
Dactylis glomerata var. ciliata Peterm.	+	+	+	+	+	+
Dactylis glomerata var. detonsa Fries	+	+		+	+	+
Dactylis glomerata var. vivipara (Lange) Carpenter			+			
Diplachne maritima Bickn.		+		+	+	+
Diplachne uninervia (Presl) Parodi				+		
Distichlis spicata (L.) Greene	+	+		+	+	+
Eragrostis capillaris (L.) Nees	+	+	+	+	+	+
Eragrostis Frankii C. A. Mey.		+	+	+		+
Eragrostis hypnoides (Lam.) BSP.	+	+	+	+		+
Eragrostis intermedia Hitchc.				+		
Eragrostis megastachya (Koel.) Link	+	+	+	+	+	+
Eragrostis multicaulis Steud.	+	+	+	+		+
Eragrostis pectinacea (Michx.) Nees	+	+	+	+	+	+
Eragrostis pilosa (L.) Beauv.		+		+		+
Eragrostis poaeoides Beauv.			+	+		+
Eragrostis spectabilis (Pursh) Steud.		+		+		+

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
II. Festuceae—*Cont.*						
Eragrostis spectabilis var. sparsihirsuta Farwell	+	+	+	+	+	+
Festuca capillata Lam.	+	+	+	+	+	+
Festuca elatior L.	+	+	+	+	+	+
Festuca obtusa Spreng.	+	+	+	+	+	+
Festuca ovina L.	+	+	+	+	+	+
Festuca ovina var. duriuscula (L.) Koch			−	+		+
Festuca ovina f. hispidula (Hack.) Holmb.			−	+		+
Festuca prolifera (Piper) Fern.	+	+				
Festuca rubra L.	+	+	+	+	+	+
Festuca rubra var. commutata Gaud.	+	+		+	+	+
Festuca rubra f. megastachys (Gaud.) Holmb.	+			+		+
Festuca rubra var. multiflora (Hoffm.) Asch. & Graeb.	+			+		
Festuca rubra f. squarrosa (Fries) Holmb.		+	+	+		+
Festuca rubra var. trichophylla Gaud.		+				
Festuca saximontana Rydb.			+			
Glyceria acutiflora Torr.	+	+	+	+	+	+
Glyceria borealis (Nash) Batchelder	+	+	+	+	+	+
Glyceria canadensis (Michx.) Trin.	+	+	+	+	+	+
Glyceria Fernaldii (Hitchc.) St. John	+	+	+	+		+
Glyceria fluitans (L.) R. Br.				+		
Glyceria grandis Wats.	+	+	+	+	+	+
Glyceria grandis f. pallescens Fern.	+					+
Glyceria laxa Scribn.	+	+		+		+
Glyceria melicaria (Michx.) Hubb.	+	+	+	+	+	+
Glyceria obtusa (Muhl.) Trin.	+	+		+	+	+
Glyceria pallida (Torr.) Trin.	+	+		+	+	+
Glyceria septentrionalis Hitchc.	+	+		+	+	+
Glyceria striata (Lam.) Hitchc.	+	+	+	+	+	+
Glyceria striata var. stricta (Scribn.) Fern.	+	+	+	+		
Molinia caerulea (L.) Moench.	+		+			+
Pappophorum mucronulatum Nees	+					
Phragmites communis Trin. var. Berlandieri (Fournier) Fern.	+		+	+	+	+
Poa alpigena (Fries) Lindm. f.	+	+				
Poa alsodes Gray	+	+	+	+		+
Poa angustifolia L.	+	+	+	+	+	+
Poa annua L.	+	+	+	+	+	+
Poa Chapmaniana Scribn.				+		
Poa compressa L.	+	+	+	+	+	+
Poa glauca Vahl	+	+	+			
Poa languida Hitchc.			−	+	+	+
Poa laxa Haenke	+	+	+			
Poa nemoralis L.	+	+	+	+	+	+
Poa nemoralis var. glaucantha (Gaud.) Reichenb.						+
Poa palustris L.	+	+	+	+	+	+
Poa pratensis L.	+	+	+	+	+	+
Poa saltuensis Fern. & Wieg.	+	+	+	+		+
Poa saltuensis var. microlepis Fern. & Wieg.	+	+				

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
II. Festuceae—*Cont.*						
Poa sylvestris Gray			–			
Poa trivialis L.	+	+	–	+	+	+
Puccinellia distans (L.) Parl.	+		+	+		+
Puccinellia distans var. angustifolia (Blytt) Holmb.				+		
Puccinellia fasciculata (Torr.) Bickn.	+			+	+	+
Puccinellia maritima (Huds.) Parl.	+	+		+	+	
Puccinellia Nuttalliana (Schult.) Hitchc.	+		+			
Puccinellia paupercula (Holm) Fern. & Weath. var. alaskana (Scribn. & Merr.) Fern. & Weath.	+	+		+	+	+
Schizachne purpurascens (Torr.) Swall.	+	+	+	+	+	+
Schizachne purpurascens f. albicans Fern.	+	+				+
Scleropoa rigida (L.) Griseb.				+	+	
Triodia flava (L.) Smyth		+	+	+	+	+
Triplasis purpurea (Walt.) Chapm.	+	+		+	+	+
Vulpia megalura (Nutt.) Rydb.	+					
Vulpia myurus (L.) K. C. Gmel.	+			+	+	
Vulpia octoflora (Walt.) Rydb. var. tenella (Willd.) Fern.	+	+	+	+	+	+
III. Hordeae						
Agropyron pungens (Pers.) R. & S.	+			+		
Agropyron repens (L.) Beauv.	+	+	+	+	+	+
Agropyron repens f. aristatum (Schum.) Holmb.	+	+	+	+	+	+
Agropyron repens f. pilosum (Scribn.) Fern.	+	+		+		+
Agropyron repens var. subulatum (Schreb.) Reichenb.	+	+	+	+	+	+
Agropyron repens var. subulatum f. heberhachis Fern.	+			+	+	
Agropyron repens var. subulatum f. setiferum Fern.	+	+	+	+		+
Agropyron repens var. subulatum f. Vaillantianum (Wulf. & Schreb.) Fern.	+	+	+	+	+	+
Agropyron repens f. trichorrhachis Rohlena	+	+	–	+		+
Agropyron Smithii Rydb.		+				
Agropyron trachycaulum (Link) Malte var. glaucum (Pease & Moore) Malte	+	+	+	+		+
Agropyron trachycaulum var. majus (Vasey) Fern.	+	+	+			
Agropyron trachycaulum var. novae-angliae (Scribn.) Fern.	+	+	+	+	+	+
Elymus arenarius L. var. villosus E. Mey.	+	+		+		
Elymus canadensis L.	+	+	+	+		+
Elymus canadensis f. glaucifolius (Muhl.) Fern.			+	+	+	+
Elymus caput-medusae L.						+
Elymus riparius Wieg.	+	+	+	+	+	+
Elymus villosus Muhl.			+	+	+	+
Elymus villosus f. arkansanus (Scribn. & Ball) Fern.			+	+		+
Elymus virginicus L.	+	+	+	+	+	+

	Me.	N. H.	Vt.	Mass.	R. I.	Conn.
III. Hordeae—*Cont.*						
Elymus virginicus f. hirsutiglumis (Scribn.) Fern.	+	+	+	+	+	+
Elymus virginicus var. glabriflorus (Vasey) Bush		+	+	+		+
Elymus virginicus f. australis (Scribn. & Ball) Fern.			+	+	+	+
Elymus virginicus var. halophilus (Bickn.) Wieg.	+			+	+	+
Elymus virginicus var. jejunus (Ramaley) Bush	+					
Elymus virginicus var. submuticus Hook.				+	+	
Elymus Wiegandii Fern.	+	+	+	+		+
Elymus Wiegandii f. calvescens Fern.	+	+		+		
Hordeum aegiceras L.			+			
Hordeum jubatum L.	+	+	+	+	+	+
Hordeum marinum Huds.				+		
Hordeum murinum L.	+			+		+
Hordeum nodosum L.	+			+		
Hordeum pusillum Nutt.	+					
Hordeum vulgare L.	+	+	+	+	+	+
Hordeum vulgare var. trifurcatum (Schlecht.) Alefeld	+					+
Hystrix patula Moench	+	+	+	+	+	+
Hystrix patula var. Bigeloviana (Fern.) Deam	+	+	+	+	+	+
Lolium multiflorum Lam.	+	+	−	+	+	+
Lolium multiflorum var. diminutum Mutel	+	+	+	+		+
Lolium perenne L.	+	+	−	+	+	+
Lolium temulentum L.	+		−	+	+	+
Lolium temulentum var. leptochaetum A. Br.				+		+
Nardus stricta L.		+				
Secale cereale L.	+	+	+	+	+	+
Triticum aestivum L.	+	+	−	+	+	+

For an explanation of names in the above list which are not to be found in Gray's Manual, the following references may be consulted: Fernald, RHODORA XVIII. 177 and XXXV. 258 (*Spartina*); Fernald, RHODORA XXXII. 63 and XXXV. 316, Hitchcock, RHODORA VIII. 211, and Wiegand, RHODORA XXIV. 89 (*Bromus*); Fernald, RHODORA XXXV. 137 (*Dactylis*); Fernald, RHODORA XL. 108 (*Eragrostis multicaulis*); Hubbard, RHODORA XVIII. 235, Fernald, RHODORA XXXIV. 209, XXXV. 132 and XXXVII. 250 (*Festuca*); Fernald, RHODORA XL. 107 (*Vulpia*); St. John, RHODORA XIX. 75, Hubbard, RHODORA XIV. 186, and Fernald, RHODORA XXXI. 211 (*Glyceria*); Fernald, RHODORA XXXIV. 211 (*Phragmites*); Hubbard, RHODORA XVIII. 235 (*Poa palustris*); Fernald & Wiegand, RHODORA XX. 122 (*Poa saltuensis* and variety); Fernald & Weatherby, RHODORA XVIII.

1 (*Puccinellia*); Fernald, RHODORA XXX. 161 (*Agropyron*); Wiegand, RHODORA XX. 81, and Fernald, RHODORA XXXV. 187 (*Elymus*); Fernald, RHODORA XXIV. 229 (*Hystrix patula* var. *Bigeloviana* as *Asperella Hystrix* var. *Bigeloviana*). Additional names not given in Gray's Manual may be found in "Manual of the Grasses of the United States" by A. S. Hitchcock, Washington, 1935.

Geographically, the ranges of the groups here considered are well divided between northern and southern, as in our preceding report, (RHODORA XXXVIII. 263–271). The grasses in this list belong in geographic groups which have been used and defined in previous reports. As usual, varieties and forms which seem to have no geographic significance within our area are omitted. There are no strictly calcicolous representatives, nor are there grasses which have a range covering the region east of the Connecticut River only.

I. Generally distributed:—*Agropyron repens*, *Elymus virginicus*, *Glyceria canadensis*, *G. Fernaldii*, *G. grandis*, *G. striata*, *Poa angustifolia*, *P. palustris* and *P. pratensis*.

Agropyron repens, the familiar witchgrass of fields and gardens, seems not to have been extensively collected inland, perhaps because of its general abundance in settled areas; *Glyceria Fernaldii* has but one report from Cape Cod, none from Nantucket, Martha's Vineyard or Rhode Island, but has been collected at several stations in Connecticut, which is apparently near its southern limit of distribution.

Poa alpigena and *P. angustifolia* are generally merged in this country with an all-inclusive *P. pratensis* L. Professor Fernald supplies the following memorandum. "In both *P. pratensis* and *P. angustifolia* all or nearly all of the culms bear erect or strongly ascending tufts of new green leaves from the basal sheaths, whereas *P. alpigena* has the culms chiefly arising from among old dried leaves at the tips of last year's stolons, the basal leaf-tufts all or nearly all on separate prolonged stolons or offsets. In *P. pratensis* the soft to firm culms are compressed at base and often geniculate, 2–3 mm. thick at base; the basal leaves flat or flattish, as broad as the thickness of the culm; glumes lanceolate to ovate, nearly straight. *P. angustifolia* has the firm and erect culms terete at base, there 1–2 mm. thick; basal shoots with some

(often numerous) filiform to involute blades much more slender than the culm; glumes narrowly lanceolate, the second one arching. In both these species the lemma is copiously webbed at base, the intermediate nerves glabrous, but in *P. alpigena* the nerves are pubescent. The latter boreal species extends south to Newfoundland, the Magdalen Islands, Prince Edward Island, northern Maine, and the alpine region of Mount Washington, New Hampshire."

II. Rather general except in southeastern Massachusetts;—*Agropyron trachycaulum* var. *glaucum, Bromus ciliatus* var. *intonsus, Glyceria borealis, G. melicaria, Poa saltuensis.*

Southward *Glyceria borealis* extends to northern Rhode Island and Connecticut, but apparently is absent from the central and southern sections of these states. *Glyceria melicaria* is missing from Rhode Island and eastern Massachusetts, save for one station on the Merrimack River. *Poa saltuensis* is not present in southeastern New Hampshire, eastern Massachusetts or Rhode Island.

III. Northern A. (with numerous stations south of 43°): *Agropyron trachycaulum* var. *novae-angliae, Bromus ciliatus, Glyceria striata* var. *stricta, Poa nemoralis.*

IV. Northern B. (with not many stations south of 43°): *Agropyron trachycaulum* var. *majus, Poa glauca, P. saltuensis* var. *microlepis.*

Agropyron trachycaulum var. *majus* has been collected in Maine in the Katahdin and Kineo regions, in Washington County and sparingly westward along the coast; in New Hampshire at Northumberland, Woodstock and in the White Mountain Region; and in Vermont at Canaan. It is also reported in the Vermont Flora from Willoughby and scattered stations in the western part of the state.

V. Alpine: *Festuca prolifera, F. saximontana, Poa laxa, P. alpigena* (except in northern Maine).

Festuca prolifera has been collected on Mount Washington and Katahdin as has also *Poa laxa.* The latter also is found on Mount Mansfield. *Festuca saximontana* has been collected at Smuggler's Notch and *Poa alpigena* on Mount Washington.

VI. Neither northern Maine nor southeastern Massachusetts: *Elymus riparius, Festuca obtusa, Hystrix patula, H. patula* var. *Bigeloviana.*

Elymus riparius, as its name indicates, is a plant of river shores. *Festuca obtusa*, *Hystrix patula* and its variety are plants of rich mainly deciduous woods. None of these species extend east of the Kennebec valley. *Festuca obtusa*, in fact, has but one Maine station (Vassalboro). The absence of these species from northern and eastern Maine might give a false impression of the distribution of the species as a whole as *Hystrix* and *Festuca obtusa* are both found on North Mountain, Nova Scotia and in the St. John Valley, New Brunswick.

VII. Chiefly the three southern states:—*Bromus Kalmii*, *B. purgans*, *Elymus canadensis*, *E. villosus*, *Eragrostis capillaris*, *E. pectinacea*, *E. spectabilis*, *E. spectabilis* var. *sparsihirsuta*, *Glyceria acutiflora*, *G. pallida*, *G. septentrionalis*, *Poa languida*, *Triodia flava*, *Vulpia octoflora* var. *tenella*.

While these species are chiefly found in southern New England, some of them do extend into Maine, *Bromus Kalmii* reaching Oxford County, Maine, and *Elymus canadensis* reaching Maine, as well as northern New Hampshire and northern Vermont (also New Brunswick). Many of these species have also been collected in western Vermont. Several of these species are absent from western Massachusetts and from southeastern Massachusetts, Martha's Vineyard and Nantucket. These include *Bromus Kalmii*, *B. purgans*, *Elymus canadensis*, *E. villosus*, *Eragrostis capillaris*, *Poa languida*.

The typical smooth form of *Eragrostis spectabilis* has been collected at three stations in southern New Hampshire, at two in the Boston area, on Martha's Vineyard and Nantucket, and at Bridgeport, Connecticut. The variety *sparsihirsuta*, which is poorly named, since it is usually conspicuously hirsute, is extremely abundant and extends considerably further northward.

VIII. Western New England only:—*Eragrostis Frankii*, *E. hypnoides*. *Eragrostis hypnoides* occurs along Lake Champlain and Otter Creek in Vermont, near the Housatonic River in Western Massachusetts and Connecticut, and on the Connecticut River as far north as the Hanover region. There is a single station on the Stillwater River at Orono, Maine. *Eragrostis Frankii* is more restricted with stations at Manchester and Walpole, New Hampshire, Westminster, Vermont, and numerous stations along the lower Connecticut River and westward.

IX. Maritime (in the vicinity of the coast with no inland stations):—*Diplachne maritima, Distichlis spicata, Elymus arenarius* var. *villosus, E. virginicus* var. *halophilus, Puccinellia fasciculata, P. maritima, P. paupercula* var. *alaskana, Spartina alterniflora, S. alterniflora* var. *pilosa, S. caespitosa, S. cynosuroides, S. patens, S. patens* var. *juncea, Triplasis purpurea.*

Diplachne maritima is at Seabrook, New Hampshire, has one report from the Boston region, and is occasional from Falmouth and Nantucket, Massachusetts, westward along the coast. *Distichlis spicata* is common as far north as Cumberland County, Maine with outlying stations at Rockland and South Thomaston. *Elymus arenarius* var. *villosus* is a boreal species abundant on the Maine coast westward to Cape Elizabeth, with isolated stations at Hampton and Isles of Shoals, New Hampshire, Cape Ann and Provincetown, Massachusetts. *Puccinellia fasciculata* is known from Great Duck Island, Maine, Plum Island, Massachusetts, and from Cape Cod westward. *Puccinellia maritima* is more local, ranging from Newport, Rhode Island, to Casco Bay, Maine, with eastern outposts at Ocean Point and Isle au Haut. *Puccinellia paupercula* var. *alaskana*, a boreal species, is abundant westward to New Hampshire, and has isolated stations at Wellfleet, Hyannis, Gay Head and Cuttyhunk, Massachusetts, Westerly, Rhode Island, and Old Lyme, Connecticut. *Spartina caespitosa* is rather local, occurring from the Thames River, Connecticut, to Seabrook, New Hampshire, with a single station at South Thomaston, Maine. *Spartina cynosuroides* has been collected in Massachusetts at Salisbury, Nantucket, and Sandwich, Dennis and Brewster on Cape Cod; and at several stations from the mouth of the Connecticut River westward. *Spartina patens* var. *juncea* is common as far north as Plum Island, Massachusetts and Seabrook, New Hampshire. *Triplasis purpurea* is frequent northward to York, Maine.

X. Miscellaneous:—*Agropyron repens* var. *subulatum, Bromus Dudleyi, B. latiglumis, Festuca rubra, Glyceria laxa, G. obtusa, Phragmites communis* var. *Berlandieri, Spartina pectinata.*

Agropyron repens var. *subulatum*, while essentially a plant of seashore areas, also follows the rivers and sand plains inland. *Bromus Dudleyi*, an early blooming grass closely related to *B. ciliatus*, might be considered as belonging in the Northern A

group were it not for the fact that it seems to be absent from northern Maine and northern Vermont. Although it has been collected only at scattered stations it is often abundant where it does occur. *Bromus latiglumis* does not occur in southeastern Maine (east of the Kennebec River), in southeastern Massachusetts, or in Rhode Island. *Glyceria laxa*, a plant of moist soil, often flourishing in wet peat and wet glades of the Canadian type of forest, is frequent in Washington County, Maine, on Mount Desert, and in the Penobscot Bay region. It has also been collected at Milford, Monhegan and South Berwick, Maine, Wolfeboro and Hooksett, New Hampshire, Everett, Massachusetts, and Colebrook, Connecticut. *Glyceria obtusa* has the general range of a typical coastal plain species, save that it is apparently absent from Nantucket. There is no specimen available from that island, nor is it listed in Bicknell's Flora. It does occur, however, on the other outlying islands, Martha's Vineyard, the Elizabeth Islands and Block Island. *Phragmites communis* var. *Berlandieri* is abundant locally along the coast of Massachusetts, Rhode Island and Connecticut. There is no New Hampshire record, but there are scattered stations on the Maine coast as far east as Frankfort on the Penobscot River. Inland its distribution is erratic with scattered stations in northern Maine, western Vermont, western Massachusetts and Connecticut. *Spartina pectinata* is very abundant along the entire coast and occurs inland on sandy soil especially along lakes and rivers as far north as the St. Johns River in Maine, and Lakes Memphramagog and Champlain in Vermont. Naturally it is absent from mountainous regions.

There are a very large number of introduced grasses in the three tribes considered in this report. Many of these are waifs or casuals which have been found in vacant lots in cities and have appeared only once or twice. Wool waste has brought in many species. Others like the Festucas, *Lolium* and *Cynosurus* have come in with grass seed. Several of these grasses have become very persistent weeds, as in the case of *Bromus tectorum*, *Hordeum jubatum*, and in some cities, *Eleusine indica*.

The Boston region has produced a large number of these grasses, partly because of the extensive areas of unoccupied land, and partly because so many metropolitan botanists collected

extensively in these waste places, especially during the days when ballast was unloaded by incoming vessels.

Among the wool-waste plants are *Chloris elegans*, *C. cucullata*, the Boutelouas, and *Hordeum pusillum*.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. Fernald

(*Continued from page 16*)

1. Salix eriocephala Michx. Fl. Bor.-Am. ii. 225 (1803) is represented by a good branch (except for broken leaf-tips) of the foliage "oblongo-ovalibus, basi subretusis, serrulatis", which my note of 1903 described "foliage of oblong-leaved *cordata*", and a flowering branch which clearly gave the name to the species, "S. diandra: ramulis minutim tomentosis: . . . amentis ovalibus, confertim villosissimis", "*Hab.* in regione Illinoensi", my note on it being "flowering branch near *discolor*". The type is material of the tomentulose-branched *S. missouriensis* Bebb in Garden and Forest, viii. 379 (1895). It has been erroneously placed with *S. discolor* as *S. discolor* Muhl., var. *eriocephala* (Michx.) Anderss. in DC. Prodr. xvi². 225 (1868), the very large precocious aments and long (up to 1 cm.) capsules having deceived those who did not consider its other characters, into thinking it *S. discolor*. Michaux's "foliis oblongo-ovalibus, basi subretusis" is not good for *S. discolor* which becomes relatively local in southern Illinois and adjacent eastern Missouri. Michaux collected his *S. eriocephala* "in regione Illinoensi". That meant southernmost Illinois, for Michaux went down the Ohio, camped at the mouth of the Wabash and then proceeded to the Mississippi near the mouth of the Ohio. Here *S. missouriensis* abounds ("Plants of the Lower Wabash Valley", Robt. Ridgeway, no. 1580), Ball explicitly referring to it "in Illinois along the Ohio River near its

junction with the Mississippi" (Ball in Deam, Shrubs Ind. 52), just the region where Michaux got his *S. eriocephala.* The very weak photograph which I got of the foliage of Michaux's type might almost as well have been taken from *Ridgway*, no. 1580 from the Lower Wabash, from Glatfelter's material from Crève Coeur, St. Louis Co., Missouri, or from *Ball & Over*, nos. 2233, 2235 and 2246 from South Dakota—these all characteristic broad-leaved representatives of *S. missouriensis.*

2. S. CORDATA Michx. l. c. (1803). This, although omitted from Index Kewensis, has nothing to do with the later published and generally more southern *S. cordata* Muhl. It was from Lake St. John, the entire treatment being

> CORDATA. S. ramulis foliisque villosis: foliis cordato-ovalibus, acuminatis, argute serrulatis; stipulis foliaceis, maximis.
> *HAB.* in Canada, ad lacum *S. Joannis.*

The shrub was very familiar to me when I studied Michaux's type, for only three years earlier I had been collecting it along the Aroostook River in northern Maine, hence my memorandum: "The most extreme broad-leaved pubescent form of the Aroostook R., once taken by me for *S. adenophylla* [with absolute correctness as it proves]." See later discussion.

3. S. INCANA Michx. l. c. (1803), not Schrank (1789). My memorandum accords with the long-held identification: "The true *candida* with flocculent pubescence. The spec. labelled 'Lac Mistassins et Riv. des Goelands'."

4. S. LONGIROSTRIS Michx. l. c. 226 (1803). My note says merely "One of the *tristis* forms". It is generally treated as *S. tristis* Ait. (1789).

5. S. CAROLINIANA Michx. l. c. (1803). Although *S. caroliniana* is commonly placed in the unquestioned synonymy of *S. nigra* Marsh., with which, in 1903, I was very familiar, I did not recognize the Michaux material of his *S. caroliniana.* Michaux identified it with the "*S. pentandra?*" of Walt. Fl. Carol. 243 (1788), which had "foliis glabris serratis nitidis lanceolatis" and which, if it at all resembled the Eurasian *S. pentandra* L., could not have looked very much like *S. nigra* Marsh., with, to quote Deam's Flora of Indiana, "leaves linear-lanceolate". Michaux's *S. caroliniana* was described as follows:

Photo. B. G. Schubert

SALIX RIGIDA (*S. cordata* Muhl.): FIG. 1, leaf of type of *S. cordata* Muhl., × 1, after *Muhlenberg;* FIGS. 2 and 3, staminate and pistillate flowering branches, × 1; FIG. 4, portion of fruiting ament, × 5.

Photo. B. G. Schubert

SALIX CORDATA Michaux (*S. adenophylla* Hook.): FIG. 1, type of *S. adenophylla*, × ca. ½; FIG. 2, margin of leaf of type of *S. adenophylla*, × 10; FIGS. 3 and 4, leafy tip and fruiting ament, × ⅘, from probable type-region of *S. adenophylla*.

Photo. B. G. Schubert

SALIX CORDATA Michaux. FIGS. 1, 2, 3 and 6 from Michaux's TYPE-REGION: FIGS. 1 and 2, leafy tips, × ⅘; FIGS. 3 and 4, stipules and leaf-bases, × 5; FIGS. 5 and 6, leaf-margins, × 10; FIG. 7, staminate ament, × ⅘.

Photo. B. G. Schubert

SALIX CORDATA Michaux: FIG. 1, staminate flowering branch, × 4/5; FIG. 2, pistillate flowering tip, × 4/5; FIG. 3, fruiting ament, × 4/5; FIG. 4, portion of young, and FIG. 5, portion of flowering staminate ament, showing blackish bracts, × 10.

Photo. B. G. Schubert

SALIX CORDATA Michaux: FIG. 1, fruiting branch, × 1; FIG. 2, lower surface of mature leaf, showing delicate venation, × 10; FIG. 3, portion of fruiting ament, showing short pedicels, × 10.

Photo. B. G. Schubert

SALIX SYRTICOLA: FIG. 1, pistillate, and FIG. 2. staminate branch, × 4/5, from TYPE.

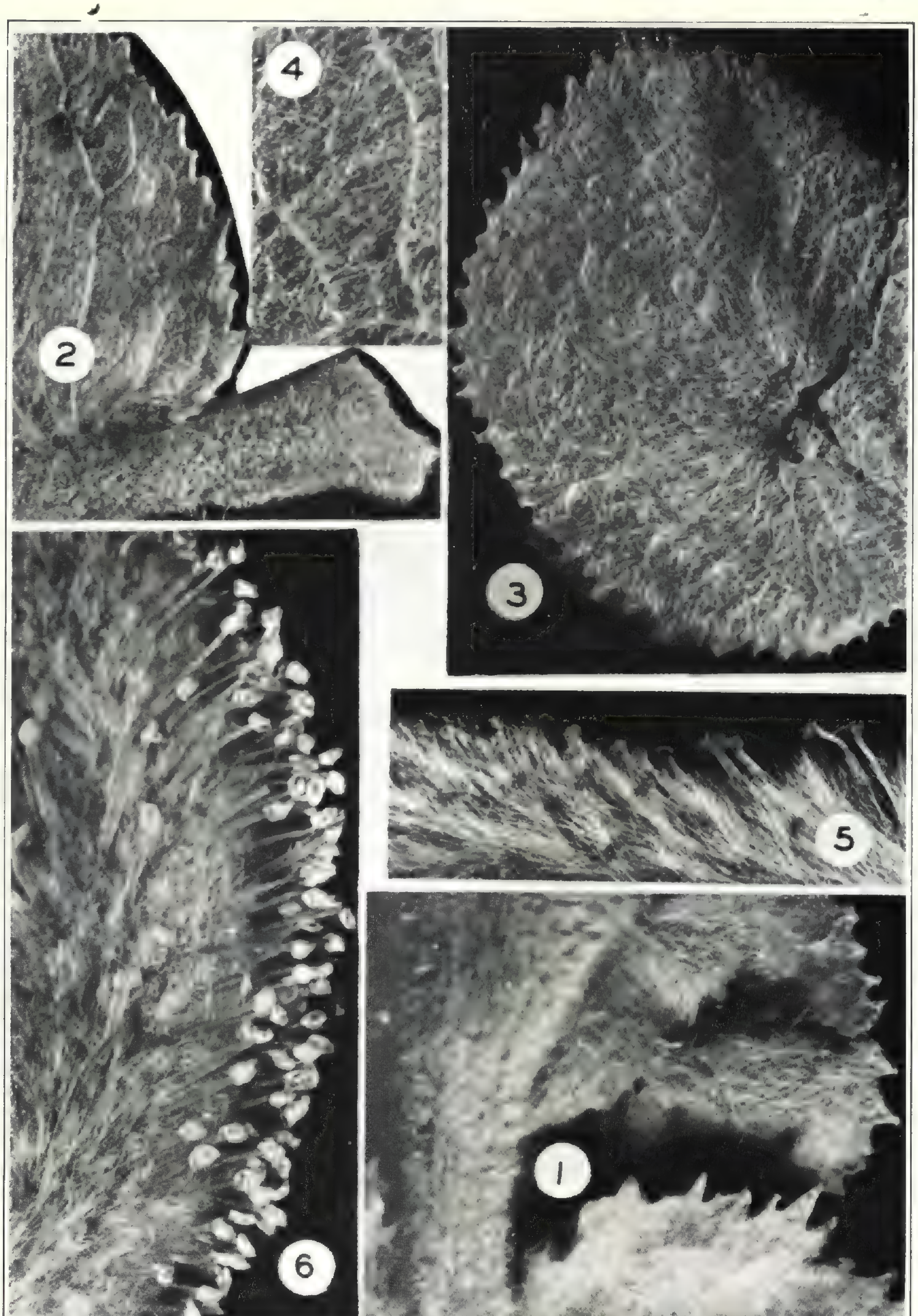

Photo. B. G. Schubert

SALIX SYRTICOLA: FIG. 1, portion of stipule, petiole and leaf-base, × 5; FIG. 2, petiole and leaf-base, × 5; FIG. 3, portion of stipule, × 5; FIG. 4, venation of lower leaf-surface, × 10; FIG. 5, portion of flowering pistillate ament, × 5; FIG. 6, portion of staminate ament, showing pale bracts, × 5, from TYPE.

Photo. B. G. Schubert

SALIX RETICULATA: FIG. 1, portion of staminate ament, × 10.

S. RETICULATA, var. SEMICALVA: FIG. 2, portion of TYPE, × ⅘; FIG. 3, staminate ament and lower surface of leaf, × 3, from TYPE; FIG. 4, portion of staminate ament, × 10, from TYPE.

CAROLINIANA. S. foliis lanceolatis, subtiliter arguteque serrulatis, subsessilibus: staminibus 4–6: amenti foeminei squamis oblongis, minutissime partimque lanuginosis; ovariis oblongis, glabris.

S. pentandra ? WALT.

OBS. Affinis *S. triandrae.*

HAB. in Carolina et Georgia.

In studying the American willows Schneider had before him the vast accumulations in all the larger American herbaria and it is significant that, with all these collections before him, he was unable to find any typical *S. nigra* from much of North and South Carolina and Georgia: "A very well-known eastern species the range of which seems to extend along the Atlantic coast from southern New Brunswick to northern North Carolina, and westward through northwestern South Carolina and northern Georgia (from where I have not yet seen typical material) to central and eastern Alabama . . . , southern Arkansas", etc. (Schneid. in Journ. Arn. Arb. i. 6 (1919)). In *S. nigra*, according to Sargent, Silva, ix. 104, "The stamens vary from three to five in number"; similarly, Andersson, the most accurate student ever to work on *Salix*, said in DC. Prodr. xvi². 200 (1868) "masc. 3-5-andris". Michaux's "4–6" slightly exceeds this and his "amenti foeminei squamis . . . partimque lanuginosis" is not too well described by Sargent's "scales . . . coated on the inner surface with pale hairs" nor by Andersson's "squamis in amentis . . . foemineis . . . glabriusculis vel basi et margine villosis".

In view of the great rarity in or absence from much of the area of "Carolina et Georgia" of *Salix nigra* and, likewise in view of Michaux's "*OBS.* Affinis *S. triandrae*", it would seem the obvious procedure to look for some common species of Carolina and Georgia which looks like the Eurasian *S. triandra* L. and which has 4 to 6 stamens, and the scales of the pistillate aments woolly at base. This is obviously *S. longipes* Shuttlew. ex Anders. (1868) and especially *S. Wardi* Bebb (1895), which Schneider treats as *S. longipes*, var. *Wardi* (Bebb.) Schneid. Typical *S. longipes* was recorded by Schneider in Journ. Arn. Arb. i. 25 et seq., "from Cuba to northern Florida . . . and from . . . adjacent southeastern Georgia . . . , South Carolina . . . , . . . eastern North Carolina . . . and in the southeastern corner of Virginia", the barely or hardly separable var. *Wardi* extending

to the District of Columbia "where it apparently reaches the most northern point of its distribution". One can hardly look at characteristic specimens of *S. triandra* without seeing marked resemblance in outline and breadth of leaves to those of *S. longipes* (including *S. Wardi*), but he would scarcely think of the more linear- and narrower-leaved *S. nigra*. Although Schneider in various papers talked around the subject, I fail to find him getting down to a concrete statement of the characters of *S. longipes* (and *Wardi*). Sargent's full description in his Silva, l. c. 107, of *S. Wardi* emphasizes "leaves lanceolate to ovate-lanceolate . . . or . . . linear-lanceolate . . . stamens . . . three to six", while *S. longipes* (as *S. occidentalis* Koch (1828), not Walt. (1788)) was defined with "leaves . . . lanceolate, . . . scales . . . oblong-obovate . . . and villous on the back . . . stamens five or six". Similarly, Ball, in his detailed description of *S. longipes* (including *Wardi*) in Deam's Shrubs of Indiana, 44, says "leaf-blades narrowly lanceolate to lanceolate, . . . scale ob-lanceolate or obovate, villous, . . . stamens 5–8". Assembling these modern statements and comparing with Michaux's we get for *S. longipes* (including *S. occidentalis* sensu Sargent and *S. Wardi*): leaves lanceolate (narrowly or broadly); scales of ament oblong-obovate or oblanceolate, villous on the back; stamens 3–8. Michaux said: leaves lanceolate; scales minutely and partly woolly; stamens 4–6; furthermore his *S. caroliniana* came from Carolina and Georgia, where *S. longipes* abounds and where *S. nigra* is rare or local.

Two more points. Quite unfamiliar with *Salix longipes* (*Wardi*) in 1903, I entered only a query against Michaux's *S. caroliniana*. This was "Form of *S. cordata?*". That was only an off-hand suggestion, but Bebb, who set up the species, *S. Wardi*, in Gard. and For. viii. 363 (1895), had originally published it as *S. nigra*, var. *Wardi* in Ward, Guide to Flora of Washington, 114 (1881). He then (1881) spoke of a form of the latter which "might be easily mistaken (in the absence of aments) for an extravagant growth of *S. cordata*". Again, in 1895, he wrote: "The statement made when this Willow was first described that in some of its forms the leaves alone, with their ample stipules, might easily be mistaken for *S. cordata*, finds striking exemplification in Professor Short's specimen in the Gray Herbarium, which

two no less competent salicologists than Mr. Carey[1] and Professor Andersson have mistaken for 'S. cordata angustata'. Indeed it is apparent from the description that this identical specimen served as the type of S. cordata angustata, 1° forma discolor, Andersson (DC., Prod. xvi². 252)." When the foliage of Michaux's type of *S. caroliniana* reminded my then quite inexperienced eye of that of *S. cordata* (surely not of *S. nigra*) I was in distinguished company, for it is an honor to approach the class with the discerning John Carey, the highest of honors to get near the limited group of most cautious salicologists with Nils Johan Andersson!

Schneider states with seeming finality regarding *Salix caroliniana* that "unfortunately no type specimen seems to exist in Michaux's herbarium at Paris"—Journ. Arn. Arb. iii. 64 (1921). But, from what I have already noted, it is evident that Schneider did not at all understand the types at Paris of Michaux's *S. eriocephala* and *S. cordata* and probably never studied them. These types and that of *S. caroliniana* were all there in 1903, when I studied and photographed some of them; of course, since the invasion of Paris by Hitler's ravaging hordes they may now be missing; but shortly before the "*blitzkrieg*" in which Paris was invaded at the opening of the recent war the TYPE was there, for Cintract took the photograph of it which is before me. This photograph shows the relatively broad young leaves paler beneath than above and the toothing of *Salix longipes*, not of *S. nigra*. I am satisfied that S. CAROLINIANA Michaux. (1803) is *S. longipes* Shuttlew. (1858), i. e. *S. Wardi* (Bebb) Bebb (1895).

S. CORDATA Michx. Fl. Bor.-Am. ii. 225 (early 1803); Poiret in Lam. Encycl. Méth. vi. 661 (1804); not Muhl. in Ges. Naturf. Freunde Neue Schr. iv. 236, t. 6, fig. 3 (late 1803 or early 1804). *S. adenophylla* Hook. Fl. Bor.-Am. ii. 146 (1839); Schneid. in Journ. Arn. Arb. i. 158 (1920) in part (excl. *S. syrticola*); St. John, Vict. Mem. Mus. Mem. **125:** 79 (1922); Raup in Sargentia, iv.

[1] In his Salices Amer. no. 22, Joseph Barratt had *Salix longipes* under a *nomen nudum* (in Index Kewensis and also cited by Schneider, so that I am not here publishing a useless name), with the following explanation: "22. *Salix Pitcheriana** Barratt, MSS. Hab. Arkansas.—Dr. Pitcher. Sea Islands of Georgia. This undescribed species is allied to *S. nigra*. I possess specimens which have been obligingly communicated by John Carey, Esq. of New York", etc. John Carey was not properly edified. On one of his labels of Georgia material he wrote: "I always supposed this to be S. nigra of Lin [who had no such species]: (no doubt it is of Ell.) but Dr. Barratt who calls himself the great authority for our willows names it a new species". "Authorities" beware!

111 (1943).—Southeastern Labrador Peninsula to James Bay, Ontario, south to Newfoundland, Nova Scotia, northern Maine, eastern Cape Cod, northern New York, Simcoe and Bruce Cos., Ontario, and northern Michigan. PLATES 997–1000.

Salix cordata Michx. has been wrongly guessed, ever since Willdenow, to be identical with the later *S. cordata* Muhl. (see pp. 14 and 28 and plates 995 and 996). In his Species Plantarum, iv². 666 (1806), Willdenow took up the later *S. cordata* Muhl., expanding Muhlenberg's original description to read "*ramis glabris viridibus.* Folia *tripollicaria oblongo-lanceolata acuminata basi cordata, margine argute serrata, serraturis cartilagineis, utrinque glabra*", etc.; and at the same time he maintained *S. rigida* Muhl. as a distinct species, although others have not been able to do so. *S. rigida* was thought to be distinguished by "*ramis viridibus superne purpurascentibus, junioribus pubescentibus.* Folia *tripollicaria rigida oblongo-lanceolata acuminata basi subcordata, margine argute serrata, serratura infime elongata apice glandulosa*" etc., not very convincing differences, especially when Muhlenberg's original figures (our PLATE 995, FIG. 1 and 996, FIG. 1) are compared. However, in *S. rigida*, with glabrous oblong-lanceolate subcordate leaves, Willdenow doubtfully included "S. (*cordata*) ramulis foliisque villosis, foliis cordato-ovalibus acuminatis argute serrulatis, stipulis foliaceis maximis. *Mich. amer.* 225?". There he had a really different species, which has positively cordate and narrowly oval or ovate leaves densely villous when young, and often to maturity, and coming originally from Lake St. John, which is more than 600 miles north of Muhlenberg's region (Lancaster County, Pennsylvania) and with a Hudsonian or Hudsonio-Canadian (instead of Alleghenian-Carolinian) flora. As stated on a previous page (28) the type of *S. cordata* Michx. from Lake St. John is surely of the northern species with densely pubescent branchlets and young foliage, which is common from southeastern Labrador Peninsula to James Bay, a species (PLATES 997–1000) of which many sheets from Lake St. John are before me. In its smallest-leaved developments it is quite identical with the type of *S. adenophylla* Hook. (PLATE 997, FIGS. 1 and 2) from "Labrador. *Dr. Morrison*", the latter region being presumably the Côte Nord of the eastern part of Saguenay County, Quebec, which in Hooker's (and Morrison's) time was included in "Labrador". At least the type of *S. adeno-*

phylla could perfectly well have come from the Natashquan River, the old "American Harbour," for Natashquan material (PLATE 997, FIGS. 3 and 4) is very like it. The photograph of Hooker's type of *S. adenophylla* was sent to the late Professor Sargent and is preserved, along with some leaves and portions of an ament at the Arnold Arboretum. In its details it is quite like specimens from Newfoundland, the Côte Nord, Lake St. John, Aroostook River, Maine, James Bay and elsewhere in the range of Michaux's species; and the photograph and fragments exactly agree with Hooker's detailed account of his *S. adenophylla:*

> 8. *S. adenophylla;* ramis brevibus subrobustis lanatis, foliis ovatis basi cordatis acutis subcoriaceis fere omnino sessilibus reticulatim venosis argute serratis serraturis elongatis glanduliferis lana sericea dense obsitis demum aetate nudiusculis, stipulis ovato-cordatis grosse glanduloso-serratis, amentis foemineis elongatis pedunculatis, capsulis ovatis acuminatis glaberrimis, stylo elongato, stigmatis lobis fissis.
>
> HAB. Labrador. *Dr. Morrison.*—I know no species like this, well marked as it is by the copious long narrow serratures to the leaves tipped with a gland, so that the leaf looks as if it were fringed with pedicellated glands. These leaves are an inch or more long, clothed, even when fully grown, with long silky tomentum on both sides, but which is deciduous on the oldest leaves . . .

Although the teeth on young and just expanding leaves of *Salix cordata* Michx. (and *S. adenophylla*) may be prolonged and gland-tipped, they are often lower, blunter and less evidently ending in glands, in such specimens the toothing approaching that of *S. rigida* Muhl. (*S. cordata* Muhl.). Furthermore, the narrowest-leaved *S. cordata* resembles the broadest-leaved *S. rigida* but the blades are more generally cordate in the former than in the latter. Measurements of all mature foliage in the Gray Herbarium gives the following results, to which I add the far more significant characters of the aments.

S. CORDATA: leaves broadly oblong-lanceolate to ovate, mostly strongly cordate, the mature ones 3–13 (av. 6.5) cm. long and 2–5.5 (av. 3.5) cm. broad; staminate aments terminating leafy axillary branchlets, the leaves well developed at anthesis, the bracts with whitish beard; pistillate aments dense, in anthesis with appressed-ascending ovaries, in fruit with the capsules crowded on very short pedicels shorter than to barely exceeding the bracts.

S. RIGIDA: leaves oblong-lanceolate, subcordate, rounded or tapering or attenuate at base, the mature blades one eighth to one third as broad as long, 4.5–15 cm. long, 0.9–4.5 cm. broad; staminate aments subtended by short bracts barely expanded at anthesis; pistillate aments in anthesis with widely (often horizontally) divergent ovaries, in fruit with the widely divergent capsules on pedicels as long as to much longer than their subtending bracts.

Typical *Salix cordata* Michx. has heavily villous branchlets and young leaves, the pubescence inclined to persist on the mature foliage. In the eastern part of its range it is represented in many areas (along certain rivers, etc.) by a glabrous or glabrescent extreme, which has the aments, stamens, short pedicels and cordate leaf of the typical extreme of the species, but with the teeth less often prolonged and gland-tipped than in that shrub. With leaf-outline and aments of *S. cordata* and occurring only in Newfoundland, eastern Canada and northern Maine, mostly north of *S. rigida*, it seems to be an extreme of the northern species. This is

S. CORDATA Michx., var. **abrasa,** var. nov., ramulis petiolisque glabris vel glabratis; foliis costa excepta glabris vel glabratis.—Newfoundland and Gaspé Peninsula, Quebec, to Nova Scotia and northern Maine. The following are characteristic. NEWFOUNDLAND: Birchy Pond Stream, *Fernald & Wiegand*, no. 3149; Harry's River (or Brook), *Fernald & Wiegand*, no. 3150; Forcele-Plain, Harry's Brook, *R. B. Kennedy*, nos. 305 and 387; Riverview Camp, Grand Codroy River, *Pease & Edgerton*, no. 27,120. QUEBEC: R. Ste. Anne des Monts, Gaspé Co., July 14–17, 1906, *Fernald & Collins*, nos. 484 (TYPE in Herb. Gray.), 485 and 486; R. Petite Cascapedia, Bonaventure Co., *Victorin, Rolland & Jacques*, no. 33,845; Bonaventure R., Bonaventure Co., Aug. 4–8, 1904, *Collins, Fernald & Pease* (*Pease*, nos. 5831 and 5897); junction of Restigouche and Matapedia Rivers between Quebec and New Brunswick, *Rousseau & Boivin*, nos. 32,037 and 32,082; Grande-Décharge, Lac St.-Jean, *Victorin, Rolland & Meilleur*, no. 45,872. NEW BRUNSWICK: Tom's Island, Restigouche R., July 30, 1896, *G. U. Hay;* lower Tobique River, Oct., 1945, *G. D. Chamberlain.* NOVA SCOTIA: Salt Springs, Pictou Co., *Perry, Wetmore, Hicks & Prince*, no. 10,134; Truro, Colchester Co., *J. G. Jack*, no. 3633; Wellington, Shubenacadie Grand Lake, Halifax Co., *Fernald, Bartram & Long*, no. 23,739 (transitional); Landsdown, Digby Co., *J. G. Jack*, no. 3704. MAINE: Fort Kent, Aroostook Co., *Fernald*, nos. 2473–2475; *Pease*, no. 2578.

Schneider, who considered *Salix cordata* Muhl. and *S. cordata* Michx. identical and who put them both into § *Cordatae*, treated *S. adenophylla* Hook. (which is really very small-leaved *S. cordata* Michx.) as the type of a separate § *Adenophyllae.* He was unable to distinguish from the latter northern species the very different shrub of sands about Lake Michigan, *S. syrticola* Fernald in RHODORA, ix. 225 (1907), (our PLATES 1001 and 1002),

Schneider saying "Unfortunately Fernald did not see Hooker's type of which I have before me an excellent photograph and some fragments from the Kew Herbarium . . . When he proposed his new species he did not know of the specimens collected by Macoun, Ross and Spreadborough in the James Bay region. They connect the original habitat of (probably southern) Labrador and that of *S. syrticola*. The only difference between the forms of James Bay and those of the Great Lakes, so far as I can judge, is in the length of the styles, which measure about 1.5 mm. in typical *S. adenophylla*, while they rarely are longer than 1 mm. in *S. syrticola*"—Schneid. in Journ. Arn. Arb. i. 158, 159 (1920).

Now it so happens that, in 1903 (again in 1930) the author of *Salix syrticola* had closely studied Hooker's type of *S. adenophylla* and he has many times studied colonies of *S. adenophylla* in Newfoundland, Quebec and northern Maine. The type, from the northeastern and rather inhospitable limit of the specific range, was unusually small-leaved and heavily pubescent, but the characters of this species (as the earlier *S. cordata* Michx.) are shown in PLATES 997–1000. Whether *S. syrticola* is fully distinct from *S. cordata* it is too soon to assert with finality. In general the two are very different in many characters, but in northern Michigan and about the Lake Huron shores of Ontario some shrubs indicate possible transitions which are no more tangible than the "mongrels" into which other species of *Salix* regularly "spawn" (to quote Bailey's picturesque phrase) when they meet and cross. Until very recently we did not know good staminate aments and the plans to secure them last June from the type-region of the northern shrub, Lake St. John, or from northern Maine were thwarted by the erratic weather, when abnormally late frosts after an abnormally early opening of spring blighted the flowers or fruits as well as vegetative tips of many species occurring from eastern Canada to the Southeastern States. Most fortunately, however, in late June and early July, Fathers Dutilly and Lepage secured beautiful freshly flowering staminate, as well as pistillate, material near James Bay. This differs at once from *S. syrticola* in many characters. As to the staminate aments, they are borne at the tips of well developed leafy branchlets, the bracteal leaves very much more developed than are those of *S. syrticola* during anthesis, and the beard of the bracts is much whiter than the fuscous beard in *S. syrticola*.

These characters of the staminate aments, accompanied by parallel ones in the pistillate, and by different outline, toothing and reticulation of leaves, different toothing of stipules, etc., lead to the following statement of contrasts.

S. CORDATA: Leaves broadly lance-oblong to oblong-ovate, long-acuminate, gradually tapering from below or near the middle, the mature ones 3–13 cm. long; each margin with 25–90 (av. 55) forward-arching at first often gland-tipped but soon glandless mostly simple teeth; the mature petiole (2–) 5-35 (av. 13) mm. long; the mature lower surface with secondary veins slender and relatively low: mature and larger stipules with 0–22 (av. 14) gland-tipped or mostly glandless teeth on the longer margin; staminate aments on leafy branchlets, the leaves well-grown at anthesis; the blackish to brown bracts with white beard: pistillate aments in maturity 2–6 cm. long; bracts narrowly obovate, fuscous or brown, their bright white beard only slightly longer; ovaries in anthesis appressed-ascending, in fruit more spreading, on pedicels shorter than bracts. PLATES 997–1000.

S. SYRTICOLA: Leaves oblong-ovate, acute or abruptly short-acuminate from well above the middle, the mature ones 3.5–9.5 cm. long; each margin with 81–137 (av. 105) horizontally or subhorizontally divergent and permanently gland-tipped prolonged often compound teeth; the mature petiole 2–10 (–15) (av. 6.3) mm. long, thicker than in the preceding; mature lower surface with secondary veins coarse and rather prominent: mature and larger stipules with 24–40 (av. 32) mostly gland-tipped and straight teeth on the longer margin: staminate aments in full anthesis subtended by leaves only about one-fourth grown; the oblong pale brown bracts with ashy-white to fuscous beard: pistillate aments in maturity 6–8 cm. long; flowers soon divergent, the mature capsules on pedicels nearly as long as to longer than blade of the oblong pale brown bract, the beard of the latter very long, ashy; style 0.7–1.5 mm. long. PLATES 1001 and 1002.

With such an abundance of distinctive characters, I find myself incapable of following Schneider in treating *S. cordata* (*S. adenophylla*) and *S. syrticola* as absolutely the same. Schneider states that the "styles . . . measure about 1.5 mm. in typical *S. adenophylla* [i. e. *cordata*], while they rarely are longer than 1 mm. in *S. syrticola*" (Schneider, Journ. Arn. Arb. i. 159). Rather naturally, however, my measurements of the style of *S. syrticola* accurately coincide with those of Ball in Deam's Shrubs of Indiana, 0.7–1.5 mm. I am not, as already emphasized, convinced that *S. cordata* (*S. adenophylla*) and *S. syrticola* are conspecific, although, as also noted above, at the northern border of the range of the latter some transitional specimens may possibly occur. So they do at the border-lines or coincident ranges of many willows. That is one of the reasons the willows are difficult; they *will* cross.

Incidentally, *Salix syrticola* has its greatest development on the dunes of Lake Michigan, especially toward the southern end of the Lake, a region famous for the isolation there of prevailingly

southern, rather than northern species. Although the dunes support *Pinus Banksiana* and a few other common Hudsonian and Canadian species, they are famous largely on account of the remarkable assemblage of far-isolated southern or southeastern species. These include *Aristida tuberculosa*, "Massachusetts to Georgia and Mississippi; around the southern end of Lake Michigan and in . . . Wisconsin, Indiana, Illinois", etc. (*Hitchcock*); *Panicum auburne*, "Massachusetts to northern Florida and Louisiana; Arkansas; Indiana, near Lake Michigan" (*Hitchcock*); *Eleocharis geniculata* (*E. caribaea*), Florida to Texas and southern California, north near coast to North Carolina, sands of Great Lakes, southern Ontario to Michigan and northwestern Indiana; *E. melanocarpa*, localized in northern Florida and Georgia, southeastern Virginia, southern New Jersey to southeastern Massachusetts, eastern Texas, and dunes of Lake Michigan; *Psilocarya nitens*, occurring from eastern Texas to Florida, thence north to southeastern North Carolina, otherwise highly localized in Sussex County, Virginia, Cape May region, New Jersey, Suffolk County, Long Island, Plymouth County, Massachusetts, and dunes of Lake Michigan; and so on to *Stachys hyssopifolia*, a very characteristic species occurring from southern New England and southeastern New York to South Carolina and isolated in southern Michigan and northwestern Indiana; or *Lycopus amplectens* Raf. (*L. sessilifolius* Gray), one of the most definite of species, occurring from Mississippi to Florida, thence to North Carolina, from southern New Jersey to southeastern Massachusetts, and among the dunes of Lake Michigan. In view of this striking southern, rather than prevailingly Hudsonian, relationship of the flora of the dunes of Lake Michigan, it is wise to hesitate before too positively asserting that *S. syrticola* of the dunes of Lake Michigan is, in spite of its many distinctive characters, identical with the shrub which prevails in the Hudsonio-Canadian area from Hudson Bay to southern Labrador and Newfoundland. Primarily upon *S. syrticola* which he misidentified with *S. adenophylla*, Schneider set up his § *Adenophyllae*, although, as quoted by me on p. 15, he admitted that he was perplexed "to draw a sharp line between [§ *Cordatae*] . . . and the [§] *Adenophyllae*". If *S. cordata* Michx. and *S. cordata* Muhl. are, as Schneider incorrectly says, identical, though clearly of the same section, and if, as it

seems to me, *S. adenophylla* is the same as *S. cordata* Michx. (not Muhl.), then § *Adenophyllae* Schneid. has a very slim basis for separation from § *Cordatae*.

The automatic abandonment of the later name, *Salix cordata* Muhl., not Michx., necessitates the following transfer:

S. RIGIDA Muhl., forma **mollis** (Palmer & Steyerm.), comb. nov. *S. cordata* Muhl., forma *mollis* Palmer & Steyerm. in Ann. Mo. Bot. Gard. xxv. 770 (1938).

S. RIGIDA Muhl., var. **angustata** (Pursh), comb. nov. *S. angustata* Pursh, Fl. Am. Sept. ii. 613 (1814). *S. cordata* Muhl., ξ. *angustata* (Pursh) Anderss. in DC. Prodr. xvi². 252 (1868).

Typical *Salix rigida* Muhl. has the leaves broadly rounded to subcordate or slightly cordate at base, one sixth to one third as broad as long, the mature blades 1.5–4.5 (av. 2.75) cm. broad. In var. *angustata* the blades taper to base or are very gradually rounded, one eighth to one fourth as broad as long, the mature ones 0.9–2.2 (av. 1.5) cm. broad.

2. ADDITIONAL NAMES AND TRANSFERS IN SALIX—

× S. **Jesupi.** *S. pameachiana* sensu Anders. in K. Svensk. Vet.-Akad. Handl. vi. 48 (1867), not Barratt (1840). *S. alba*, var. *pameachiana* Anders. in DC. Prodr. xvi.² 212 (1868), not *S. pameachiana* Barratt, basonym. *S. alba* × *lucida* Bebb in Gard. and For. viii. 423, 424, fig. 57 (1895).

Named for its discoverer, HENRY GRISWOLD JESUP (1826–1903). *Salix pameachiana* Barratt, Salices Amer. (1840) "growing about the Pameacha stream in this town [Middletown, Connecticut]" and, therefore, not a personal name as assumed by Andersson and by Schneider, who regularly used a capital initial, was said by Barratt to be "the intermediate of S. vitellina and the former [*S. decipiens* or *fragilis*]". Carey in Gray, Man. 428 (1848) treated it as *S. alba*, var. *vitellina* × *S. fragilis*. It has nothing to do with the very striking × *S. Jesupi*.

S. INTERIOR Rowlee, var. **exterior,** var. nov., foliis plus minusve persistenter sericeis breviter subacutis oblongo-lanceolatis dentibus suppressis, lamina 2–7 cm. longa ad 1.5 cm. lata.—Beaches of Aroostook River, MAINE: Caribou, July 18, 1902, *Williams, Collins & Fernald* (TYPE in Herb. Gray.; ISOTYPE in Herb. N. E. Bot. Cl.); Fort Fairfield, June 28, 1931, *Fernald & Weatherby*, no. 2432. PENNSYLVANIA: banks of Susquehanna River, above McCall's Ferry, York Co., Sept. 13, 1864, *T. C. Porter* (Herb. Phil. Acad.; fragments and tracing in Gray Herb.).

In its very short and broad leaves with suppressed teeth quite distinct from narrower-leaved typical *Salix interior*, in which the usually divergent teeth are prominent. *S. interior*, named for its extensive inland development, or its forma *Wheeleri* (Rowlee) Rouleau, extends from Alaska to Oklahoma and Arkansas, and eastward in the North to the St. Lawrence River in Quebec and the Connecticut in western New England, with a slight but isolated occurrence along the St. John in New Brunswick and the lower Restigouche in Quebec. Var. *exterior* is close to the easternmost edge of the specific range. Although the name *S. longifolia* Muhl. (1803) is still much used, it was clearly antedated by the wholly different *S. longifolia* Lam. (1778).

S. RETICULATA L., var. **semicalva,** var. nov. (TAB. 1003, FIG. 2–4 et TAB. 1004, FIG. 2–4), squamis masculis flavescentibus dorso glabris vel glabratis; antheris flavescentibus; squamis foemineis flavescentibus vel fulvis; capsulis sparse breviterque pilosis.—Limestone barrens and gravels, northern and northwestern NEWFOUNDLAND: Quirpon Island, *Wiegand, Gilbert & Hotchkiss*, no. 27,939; Cook Point, Pistolet Bay, *Fernald & Gilbert*, no. 27,936; Anse aux Sauvages, Pistolet Bay, *Fernald, Wiegand & Long*, no. 27,940; Sandy (or Poverty) Cove, Straits of Belle Isle, *Fernald, Long & Dunbar*, no. 26,586; between Nameless Cove and Mistaken Cove, straits of Belle Isle, *Wiegand, Pease, Long & Hotchkiss*, no. 27,935; Flower Cove, July 17, 1920, *Mary E. Priest;* Capstan Point, Flower Cove, *Fernald, Long & Dunbar*, no. 26,585; south of Flower Cove, *Wiegand, Pease, Long & Hotchkiss*, no. 27,934; Brig Bay, *Fernald, Long & Dunbar*, no. 26,587; St. John Island, *Fernald, Wiegand, Long, Gilbert & Hotchkiss*, nos. 27,937 and 27,938; Ingornachoix Bay, *Fernald & Wiegand*, no. 301; Gargamelle Cove, Ingornachoix Bay, *Fernald, Long & Fogg*, nos. 1578 (TYPE in Herb. Gray., July 20, 1929)—1580; Pointe Riche, *Fernald, Long & Fogg*, no. 1581.

The two collections (*Woodworth*, no. 143, and *Abbe & Odell*, no. 210), from the Torngat region of northern Labrador, have the pale bracts and the minutely puberulent ovaries of var. *semicalva*. I have seen no staminate material from that area.

Typical arctic-alpine *Salix reticulata* (PLATE 1003, FIG. 1 and 1004, FIG. 1) has the bracts of the pistillate aments dark (deep purplish to blackish), those of the staminate aments heavily villous at base on the back (as well as on the inner surface), the anthers dark (Schneider in Journ. Arn. Arb. iii. 92 (1921), in his key saying "Antherae violaceae" for *S. reticulata* as opposed to

"Antherae flavae" for *S. vestita*), the ovaries and capsules heavily white-tomentulose. The arctic shrub (especially in Eurasia) may often have silky pubescence on the young leaves, this persisting near the base of the leaf on the back; and in European (typical) specimens the peduncle is usually villous. The Newfoundland representative of the species is glabrous from the first or with the young peduncles only sparsely pilose. Its aments have yellowish-brown to fulvous bracts, these in the staminate aments only weakly pilose or promptly glabrescent, the anthers pale or yellow, while the pubescence of the capsules is so short and fine that the purplish color of the capsule is scarcely obscured.

(*To be continued*)

LYTHRUM ALATUM IN MAINE.—On 10 Aug., 1945, Mrs. Cleora D. Adams of Hartford sent me for identification a plant that she collected on 8 August in Belgrade, Kennebec County. I determined it as Lythrum alatum Pursh, and Mr. C. A. Weatherby verified my finding. We thought that this might be its first known occurrence in Maine, but Prof. Fay Hyland writes me that he has it from Fryeburg, and Ralph Bean tells Mrs. Adams that he has collected it in Clinton.

Mrs. Adams gives this note on its location. "Growing in a patch 10–12 ft. across, noticeable from highway a few hundred feet away in damp meadow in bend where R. 135 leaves R. 11, before reaching cemetery which is on both sides of the road, and before R. 135 crosses R. 27.

"Three species of butterflies were working on the flowers: one black swallow-tail, several sulphurs, and several smaller ones which I think were pearl crescents".—JOHN C. PARLIN, Canton, Maine.

Volume 48, no. 565, including pages 1–16 and plates 993 and 994, was issued 5 January, 1946.

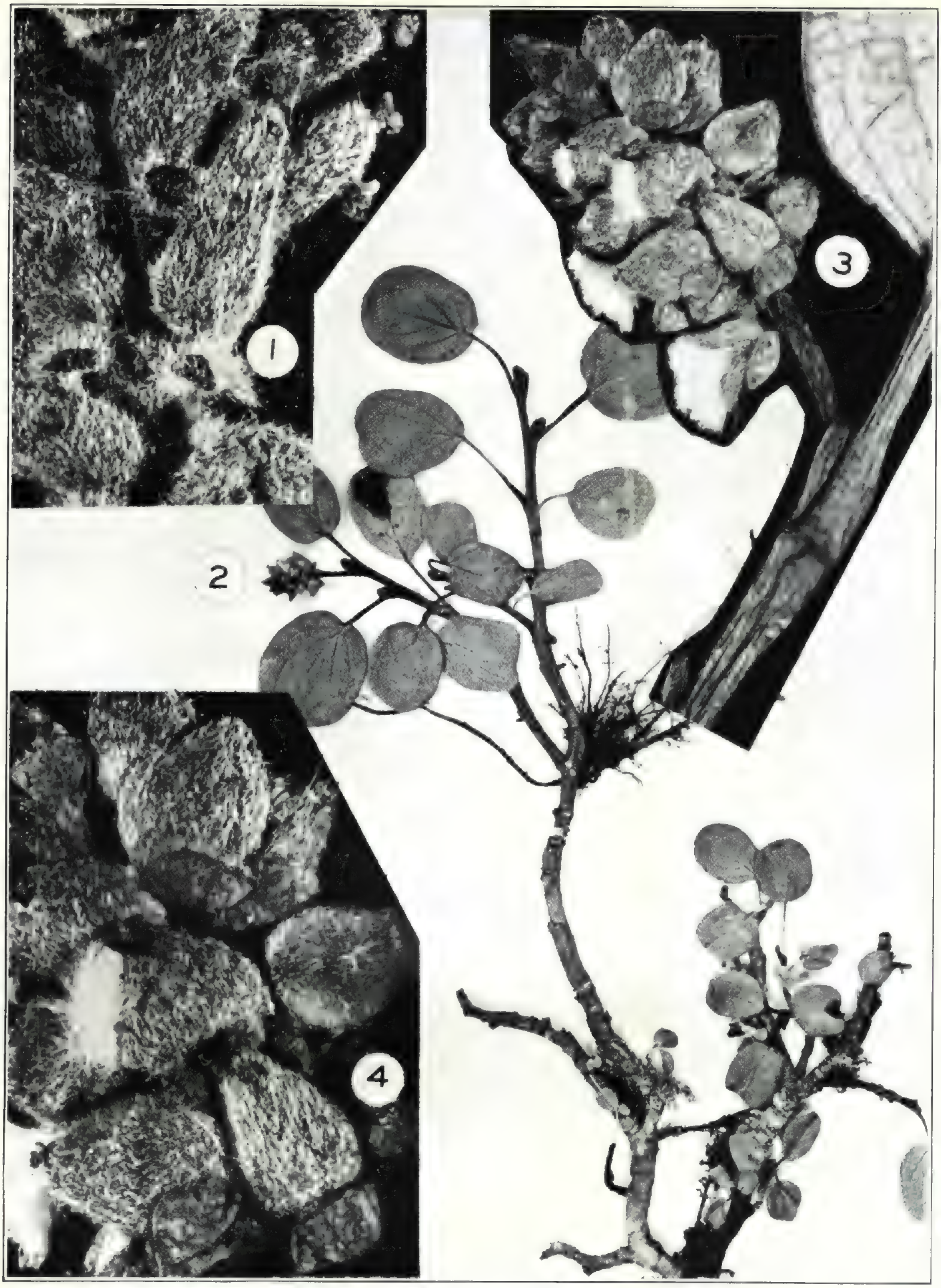

Photo. B. G. Schubert

SALIX RETICULATA: FIG. 1, portion of fruiting ament, × 10.
S. RETICULATA, var. SEMICALVA: FIG. 2, fruiting plant, × 4/5; FIG. 3, fruiting ament, × 5; FIG. 4, portion of fruiting ament, × 10.

MAR 8 1946

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Vol. 48. **March, 1946.** **No. 567.**

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. Fernald

(*Continued from page 40*)

In fact, *Salix* § *Reticulatae* has strongly diverged in Newfoundland and the adjacent Labrador Peninsula from orthodox characters of the section, Schneider in Bot. Gaz. lxvii. 44 (1919) finding "the characters of the Reticulatae . . . further changed by the inclusion of *S. leiolepis* [endemic in western Newfoundland] with glabrous ovaries". *S. leiolepis* (plate 1005), with habit of very coarse-stemmed *S. reticulata* but with strictly glabrous bracts and ovaries, is endemic, so far as known, on Table Mt., Port-au-Port Bay, 150 miles south of the southern known limit of *S. reticulata* var. *semicalva*. In the same general area with the embarrassing *S. leiolepis* the coarse and usually upright *S. vestita* is highly complex. Furthermore, this very definite coarse species of the *Reticulatae*, with very short petioles, the coriaceous leaf-blades usually heavily clothed beneath with dense and lustrous silky white hairs, and with staminate aments 1–1.5 cm. long, has diverged on Eskimo Island, west of the Straits of Belle Isle, and locally on walls of the Shickshock Mts. of the Gaspé Peninsula, as *S. vestita*, var. *psilophylla* Fernald & St. John in Vict. Mem. Mus. Mem. **126:** 44 (1922), with the membranaceous leaves glabrescent beneath, the staminate aments 1.7–2.5 cm. long. Again, along the Straits of Belle Isle the *Reticulatae* have thrown off another endemic, *S. jejuna* Fernald in Rhodora,

xxviii. 177 (1926), this tiny shrub (PLATE 1006) differing from *S. reticulata* in its very short (instead of long) petioles and short- (instead of long-) peduncled fruiting aments, and in the very long ascending villi of the papillate capsule, and from the Newfoundland *S. reticulata*, var. *semicalva* still further in its fuscous or dark purple very pubescent bracts. Furthermore, this unique little species of northernmost Newfoundland may flower twice in the same summer. In June or early July the fruits are ripe but one of the original collections, of July 16, had already fruited, while the new, vigorous shoots were already producing new flowering aments, without waiting for the next summer. Since neither of the endemic Newfoundland species of § *Reticulatæ* have been illustrated, I am showing them in PLATES 1005 and 1006.

S. VESTITA Pursh, forma **mensalis,** f. nov., trunco prostrato; foliis 1–1.6 cm. longis; amentis fructiferis 5–6 mm. longis.—NEWFOUNDLAND: mossy knolls on the limestone tableland, alt. 200–300 m., Table Mountain, Port-au-Port Bay, June 16 and 17, 1914, *Fernald & St. John*, no. 10,824, specimens distributed under an identical but unpublished varietal name.

Forming dense prostrate mats 1.5 dm. broad, with tiny leaves only 1–1.6 cm. long, and fruiting aments 5–6 mm. long; in strong contrast with the erect or ascending typical *Salix vestita* (up to 1 m. high) which has leaves 1.5–7 cm. long, the fruiting aments 0.6–1.5 cm. long.

The section *Reticulatae* Fries is unique among the diandrous *Salices*. In the tremendously extensive series of sections of diandrous willows with persistent bracts the aments or their supporting branchlets are axillary; terminal or subterminal, and the flowers are subtended by 1 or 2 slender to stout simple glands or nectaries. In the round-, roundish- or obovate- and reticulate-leaved § *Reticulatae* the peduncled aments are falsely terminal, borne just below the tip of the branchlet and on the side of the stem opposite the terminal leaf; and the glands of both staminate and pistillate flowers often form a false disk (as in *Populus*) with the margin lobed. Thus making a transition in its gland and in several other characters to *Populus*, the section was set up by A. Kerner in 1860 as a genus, *Chamitea*. Of this differentiation the late Professor C. E. Moss wrote in his Cambridge British Flora, ii. 25 (1914).

"*S. reticulata* possesses so many remarkable characters, showing it to be, in spite of the great difference in habit, intermediate in several respects between *Populus* and species of *Salix* in general, that there is little wonder that Kerner . . . suggested it should be placed in a new genus. However, the remarkable characters possessed by *S. reticulata* are so distributed among the other more primitive species of *Salix* that its generic separation from them cannot be maintained; and indeed Kerner himself at a later date accepted this view. The characters by which *S. reticulata* recalls *Populus* are the suckering habit, the long petioles, the broad laminae, and the perianthoid nature of the nectary. In its androecium, however, it has become a thorough *Salix*, more so even than *S. pentandra*, which has rather broad laminae, a double nectary, and, as a rule, 5 stamens at least. It seems to us that *S. pentandra* and *S. reticulata* diverged long ago from a primitive Salicalian stock, that each has retained a few of the *Populus*-like characters which this ancestral hypothetical group possessed, and that each of these species or their ancient allies have given rise to the other species of *Salix*, some of which . . . exhibit interesting features of convergent development."

The very primitive § *Reticulatae* consists of only a few localized species: (1) *S. reticulata* of arctic-alpine range on calcareous soils, extending south to the higher mountains of Eurasia and in America in very local areas to northwestern Newfoundland (as var. *semicalva*), shores of Hudson Bay and southern Alaska and the Aleutian Islands; (2) *S. vestita* Pursh, with localized varieties, of the Labrador Peninsula, Newfoundland, Anticosti and Gaspé, west side of Hudson Bay, Cordilleran region of southern Alberta and British Columbia to northern Montana and eastern Oregon; (3) *S. leiolepis* and (4) *S. jejuna*, Newfoundland endemics; (5) *S. nivalis* Hook. of alpine regions of the Rocky Mts.—evidently a primitive section, consisting only of a few disjoined relicts.

The pentandrous willows, on the other hand, such as those of §§ *Nigrae*, *Pentandrae* and *Bonplandianae*, are relatively southern (some even tropical) and their species, *S. nigra* Marsh., *Humboldtiana* Willd., *lucida* Muhl., *Bonplandiana* Kunth, etc., have broadly continuous ranges. Although presumably, as Moss pointed out, of as great antiquity as § *Reticulatae*, both series showing primitive characters, the pentandrous and chiefly more austral willows show no more evidence of relict-endemism than do the relatively modern diandrous species, such as *S. rigida* Muhl., *S. humilis* Marsh., *S. discolor* Muhl. or *S. Bebbiana* Sargent. § *Reticulatae*, however, has remained somewhat static and relict-endemism is one of its striking peculiarities. In view

of its concentration in northern and western Newfoundland and its association there with hundreds of other relict-species of both plants and animals, those who believe the present distribution of nonaggressive plants and animals of as great or greater significance as the remote occurrence of chance fossils, find themselves unable to subscribe to the insistence of certain geologists and others, that life on Newfoundland and in adjacent areas was wholly obliterated by Wisconsin ice. It would be most difficult to demonstrate that in that area the relatively modern sections of diandrous *Salix* have in a few thousand years given rise to localized shrubs with more primitive floral characters.

Salix, § **Uva-ursi,** sect. nov., a § *Herbaceae* Borrer differt trunco valde ligneo vix subterraneo, ramulis valde foliosis; foliis firmis nec rotundatis nec valde reticulatis subtus albidis; amentis multifloris; bracteis valde sericeis; stamine plerumque 1. Type *S. Uva-ursi* Pursh.

It is most difficult to see any close relationship of the eastern boreal American *Salix Uva-ursi* and the circumpolar *S. herbacea* L. The latter has its trunks and main branches subterranean, stoloniferous and rooting at the nodes, only the short ascending filiform branchlets above ground, these bearing 2–4 reticulate rounded slender-petioled leaves which are green on both sides, and subterminal 2–8-flowered tiny aments, with nearly glabrous bracts, and the staminate flowers with 2 stamens. *S. Uva-ursi* is a strongly ligneous prostrate shrub, forming extensive superficial and very leafy carpets; the firm leaves not rounded, whitened beneath and not conspicuously reticulate, also short-petioled; the many-flowered aments with long-silky bracts; the stamen solitary (rarely 2).

S. arctica Pallas, var. **antiplasta** (Schneider), comb. nov. *S. anglorum* Cham., var. *antiplasta* Schneider in Bot. Gaz. lxvi. 134 (1918).

Salix, § **Argyrocarpae,** sect. nov. Frutex 0.2–1.7 m. altus; foliis subtus micaceo-sericeis; stipulis minutis fugaceis; amentis fructiferis laxis; capsulis micaceo-sericeis; pedicellis elongatis glandulas duas 3–4-plo superantibus; staminibus 2. Type *S. argyrocarpa* Anders.

The boreal and alpine *Salix argyrocarpa* of northeastern America, like its associate, *S. Uva-ursi*, stands so far apart from other willows that it deserves a place in the system of Sections.

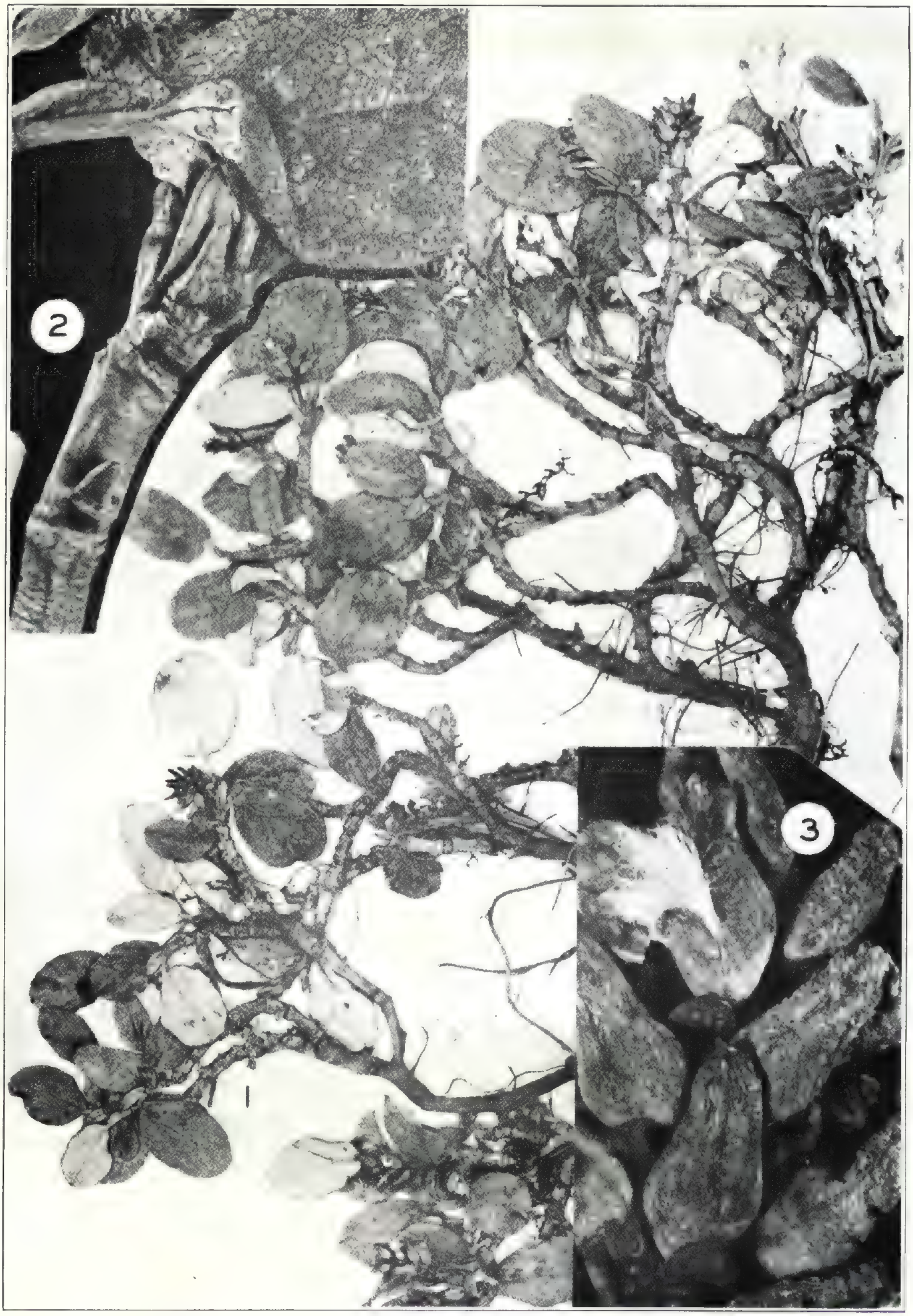

Photo. B. G. Schubert

SALIX LEIOLEPIS, all figs. from TYPE: FIG. 1, portion of shrub, × 1; FIG. 2, branchlet and portions of leaves, × 5; FIG. 3, portion of fruiting ament, showing glabrous bracts and capsules, × 10.

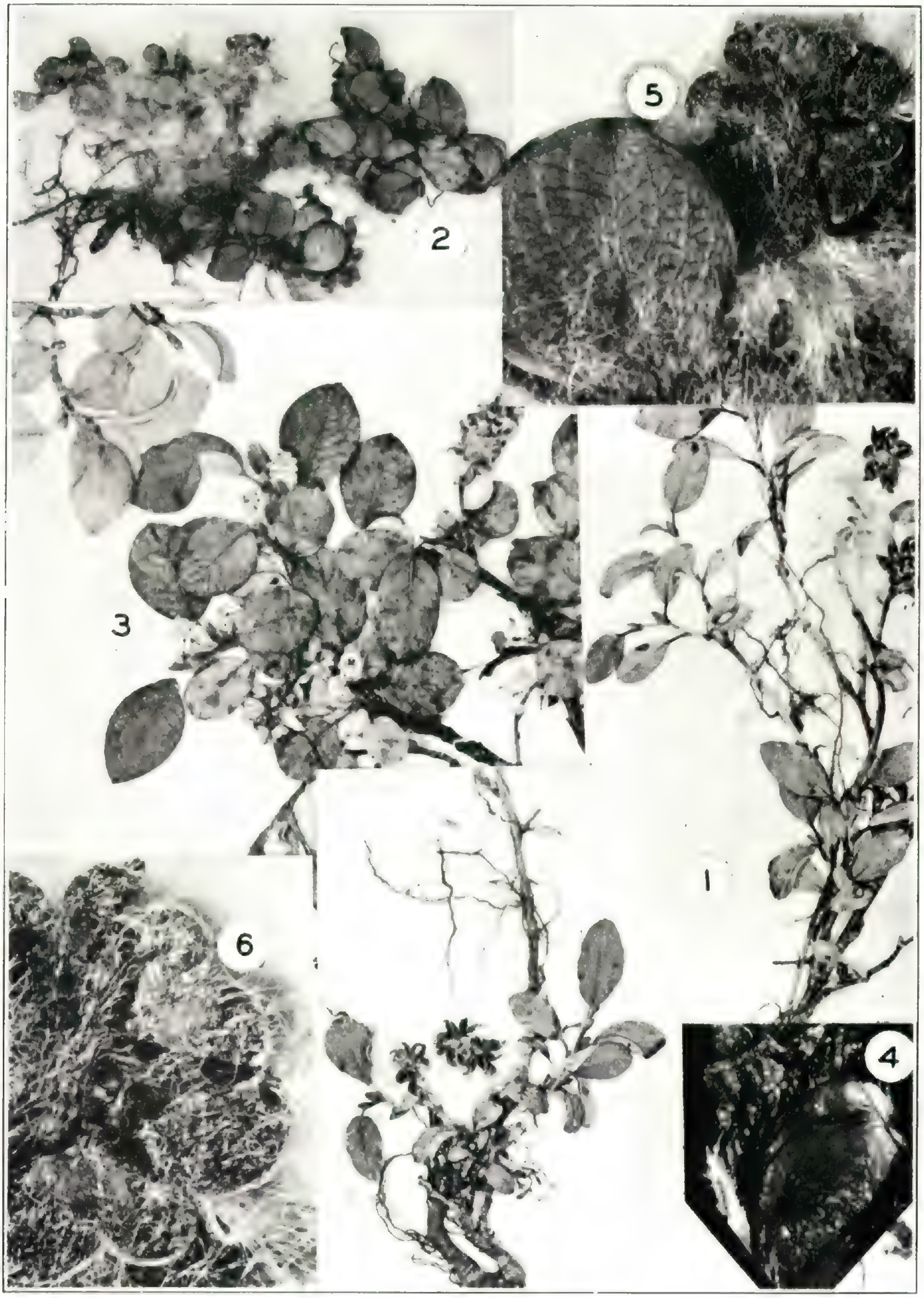

Photo. B. G. Schubert

SALIX JEJUNA: FIG. 1, two portions of TYPE, × 1; FIG. 2, a small dense shrub, × 1; FIG. 3, branch, × 1, showing 2nd flowering in midsummer; FIG. 4, expanding bud and stipule (left), × 10; FIG. 5, fruiting ament and leaf, × 5; FIG. 6, portion of fruiting ament, showing villous bracts and capsules, × 10.

Andersson, Bebb and Schneider have tried to place it in some section and the latter close student of the genus finally left it unanchored.

S. GLAUCOPHYLLOIDES Fernald, forma **lasioclada,** f. nov., ramulis persistenter griseo-velutinis. TYPE from Robinson's Brook, southwestern Newfoundland, August 10, 1930, *Rachel B. Kennedy*, no. 470, in Herb. Gray; flowering material from the same shrub, coll. June 7, 1930, no. 254.

Differing from the glabrous- and lustrous-branched typical *S. glaucophylloides* in its densely gray-velvety branchlets. Found through much of the range of typical *S. glaucophylloides.*

S. GLAUCOPHYLLOIDES Fernald, var. **albovestita** (C. R. Ball), comb. nov. *S. glaucophylla* Bebb, var. *albovestita* C. R. Ball in Journ. Wash. Acad. Sci. xxix. 492 (1939).

Unfortunately the name *Salix glaucophylla* Bebb (1881) is antedated by the same name for quite different species by Besser (1822) and by Andersson (1851). Typical *S. glaucophylloides*, occurring on gravelly shores in calcareous areas from Newfoundland to northern Ontario, south to the Gaspé Peninsula, northern New Brunswick and northern Maine, is a coarse shrub or small tree up to 5 m. high, its oblong to lanceolate or ovate leaves glaucous beneath and lustrous above, these about half-grown at anthesis, the aments subtended by 3–5 leaves. Its pistillate aments are dense, in maturity 2–6 cm. long, the capsules on pedicels only 1–1.5 mm. long. Var. *glaucophylla* (Bebb) Schneider, localized about the Great Lakes, is a low shrub (1–2.5 m. high) its aments expanding before the leaves are well grown, the pistillate aments lax and subremotely flowered, becoming 6–10 cm. long, with fruiting pedicels 2–4 mm. long. Var. *albovestita* is similar to the latter and found on dunes of the Great Lakes from New York and southern Ontario to Michigan. Its branchlets are densely pubescent and the young (sometimes the old) leaves are clothed with dense white pubescence.

S. HUMILIS Marsh., var. **hyporhysa,** var. nov. Frutex 1–3 m. altus; ramulis fertilibus 2–5 mm. crassis; foliis glabratis vel subtus sparse puberulis, subtus valde rugoso-reticulatis, lamina matura 0.7–2 (–3) cm. lata; amentis masculis 1–3 cm. longis 1–2.3 cm. crassis; amentis fructiferis 2–8 cm. longis.—*S. humilis*, var. *rigidiuscula* sensu Rob. & Fern. in Gray, Man. ed. 7: 362 (1908) not the basic *S. humilis*, var. *longifolia*, f. *rigidiuscula* Anders. (1897).—The commoner variety southward, from Florida

to eastern Texas, north on or near the coastal plain to eastern Connecticut, Long Island, New Jersey and eastern Pennsylvania, and inland to West Virginia, Ohio, southern Michigan, southern Wisconsin, Iowa and Oklahoma. Type from New Jersey: open thickets bordering brackish marshes, Manahawkin, Ocean Co., July 23, 1923, *Bayard Long*, no. 28,011 (in Herb. Gray.).

S. humilis, var. **microphylla** (Anders.), comb. nov. *S. tristis* Ait. Hort. Kew. iii. 393 (1789). *S. tristis microphylla* Anders. in Öfv. Svensk. Vet.-Akad. Frösh. xv. 126 (1858). *S. humilis*, var. *tristis* (Ait.) Griggs in Proc. Ohio Acad. Sci. iv. 301, t. x (1905).

S. humilis, var. microphylla, forma **tortifolia,** f. nov., foliis valde spiraliter tortis.—Massachusetts: Plymouth, *Wm. Oakes*, with manuscript label bearing an unpublished varietal name (type in Herb. Gray.); dry hill, Plymouth, Sept. 22, 1853, *Wm. Boott;* another sheet, with copied (not original) label, "Ipswich, Masaschusetts ex herb. William Oakes", with typical flat-leaved and twisted-leaved branches mixed.

Oakes's material was evidently collected prior to 1848. The type-sheet has above his label the stamped memorandum "Manual, 1847". Gray's Manual 425 (1848) has under *S. tristis* the note "A variety occurs with very small and rigid contorted leaves."

S. humilis, var. microphylla, forma **curtifolia** (Fernald), comb. nov. *S. tristis*, forma *curtifolia* Fernald in Rhodora, xxxvi. 195 (1934).

S. humilis, var. microphylla, forma **festiva** (Fernald), comb. nov. *S. tristis*, forma *festiva* Fernald in Rhodora, l. c. (1934).

S. gracilis Anders., var. **textoris,** var. nov., capsulis ad 9 mm. longis; foliis maturis glabratis 4–10 cm. longis ad 2 cm. latis evidenter serrato-dentatis, dentibus apice glanduliferis. (*S. petiolaris* sensu Pursh and later American authors, not J. E. Smith)—Southern Quebec to Manitoba, south to New Brunswick, New England, northern New Jersey, northeastern and central Pennsylvania, Ohio, Indiana, Illinois, northern Iowa and Nebraska. Type: Massachusetts: border of boggy meadow near Concord River, Bedford, May 11 and June 30, 1930, *Fernald, Weatherby & Anderson* in Pl. Exsicc. Gray. no. 447 (in Herb. Gray.; isotypes in many herbaria).

Typical *Salix gracilis* is smaller and generally more northern, occurring from Quebec to Alberta, south to northern Massachusetts, western Connecticut (local), northern New York, northern Michigan, northern Wisconsin and Minnesota. It is *S. petiolaris*, vars. *rosmarinoides* (Anders.) Schneid., and *angustifolia*

Anders., characterized by capsules only 5–7 mm. long, and leaves entire or only obscurely denticulate, the mature ones 2.5–7 cm. long and 3–11 mm. broad.

Var. *textoris* (of the basket-maker) is so named because of the memoranda by Joseph Barratt (Salic. Amer.) and others, Barratt (1840) stating that "Mr. Hopkins, an experienced basket-maker . . . assures me that the green osier . . . furnishes the best twigs of any Willow he knows . . . The twigs are hard, tough, and elastic, and twist well for handles . . . It furnishes long, smooth twigs with small buds; the twigs are less tapering than is usual, which enhances their value to the basket-maker."

It seems extraordinary that the identity of our low shrub, *Salix gracilis*, should, for more than a century and a quarter, have been confused by all students of *Salix* with the British tree, *S. petiolaris* J. E. Smith, Trans. Linn. Soc. vi. 122 (1802), Engl. Bot. xvi. t. 1147 (1803) and Fl. Brit. iii. 1048 (1804), etc. Our *S. gracilis* is a slender shrub with erect green to olive-brown tenuous and flexible branches 1–3 m. high; aments with narrow (linear-lanceolate to narrowly oblanceolate or spatulate) yellowish or pale brown bracts, leaves linear or narrowly lanceolate, entire to short-serrate-dentate, and 2.5–10 cm. (1–4 inches) long by 3–20 mm. (⅛–¾ inch) wide, with stipules usually quite wanting, very rarely present on the sprouts but then minute and caducous. *S. petiolaris*, at first known from meagre material sent by Dickson from Scotland, was soon better known and the treatment by Forbes, Salict. Woburn. 45 t. 23 (1829), gave a good account of it: "A bushy tree, with slender, spreading [not strongly ascending] purplish, or dark-brown [not green or olivaceous] *branches*. *Leaves* about 4 inches long, and nearly 1 broad [in *S. gracilis* 1–4 inches long, ⅛–¾ inch broad]. *Stipules* lanceolate, serrated [in *S. gracilis* wanting] . . . *Scales* rounded, notched [in *S. gracilis* elongate, entire, and yellowish; Smith's original diagnosis said "black, hairy, obovate, often notched"]. . . . *Stalk* of the germen as long as the adjoining scale", though in the plate shown as shorter [in *S. gracilis* much longer]. Forbes's beautiful plate would scarcely be taken as made from our slender and upright shrub; and European specimens, distributed as *S. petiolaris*, show a dense, curling, soft pubescence on the leaves and young branchlets, whereas the pubescence of young leaves

(rarely if ever occurring on the branchlets) of *S. gracilis* is minute, silky and closely appressed. Although Schneider talked all around the subject in Journ. Arn. Arb. ii. 16–24 (1920), there is no indication in his discussion that he actually compared our species with true *S. petiolaris*. The latter name seems to have been wholly misapplied to our material.

Explanation of Plates 995–1006

Plates 995 and 996, Salix rigida Muhl. (*S. cordata* Muhl.). Plate 995: fig. 1, leaf of type of *S. rigida*, × 1, after *Muhlenberg;* fig. 2, fruiting branch, × 1, from Hinsdale, New Hampshire, May 15, 1919, *C. F. Batchelder;* fig. 3, portion of young pistillate ament, showing characteristically divergent flowers, × 5, from Lebanon, New Hampshire, May 4, 1884, *G. G. Kennedy;* fig. 4, fruiting ament, to show small basal bracts, × ⅘, from Buckland, Massachusetts, May 21, 1906, *F. F. Forbes;* fig. 5, portion of latter ament, to show elongate pedicels, × 5. Plate 996: fig. 1, leaf of *S. cordata* Muhl., × 1, after *Muhlenberg;* fig. 2, staminate flowering branch, × 1, from Shelburne, New Hampshire, May 21, 1920, *Walter Deane;* fig. 3, pistillate flowering branch, × 1, from Lebanon, New Hampshire, May 4, 1889, *Kennedy;* fig. 4, portion of half-mature pistillate ament, showing long pedicels, × 5, from Hinsdale, New Hampshire, May 15, 1919, *C. F. Batchelder.*

Plates 997–1000, S. cordata Michaux (*S. adenophylla* Hook.). Plate 997: fig. 1, type of *S. adenophylla*, × ca. ½; fig. 2, margin of leaf of type of *S. adenophylla*, showing porrect gland-tipped teeth, × 10; fig. 3, tip of leafy branch, × ⅘, from Natashquan River, Saguenay County ("Labrador"), Quebec, July, Aug., 1912, *C. W. Townsend;* fig. 4, fruiting ament, with foliaceous bracts, × ⅘, from *Townsend* specimen. Plate 998, figs. 1, 2, 3 and 6, from specimens from Michaux's type-region, Lake St. John, Quebec: fig. 1, leafy tip, × ⅘, from Vauvert, Lake St. John, *Victorin*, no. 16,362, as *S. adenophylla;* fig. 2, tip of leafy shoot, × ⅘, from Roberval, Lake St. John, July 23, 1895, as *S. adenophylla, J. G. Jack;* fig. 3, stipules and leaf-bases, × 5, from no. 16,362; fig. 4, stipule and leaf-base, × 5, from Rivière Petite Cascapedia, Gaspé Pen., Quebec, *Victorin, Rolland & Jacques*, no. 33,846; fig. 5, leaf-margin, × 10, from Fort Fairfield, Maine, Sept. 19, 1900, *Fernald*, as *S. adenophylla;* fig. 6, leaf-margin, × 10, from no. 16, 362; fig. 7, staminate ament, × ⅘, from Moosonee, mouth of Moose River, James Bay, Ontario, *Dutilly & Lepage*, no. 14,002. Plate 999: fig. 1, staminate flowering branch, × ⅘, from Moosonee, mouth of Moose River, James Bay, Ontario, *Dutilly & Lepage*, no. 14,002; fig. 2, pistillate flowering tip, × ⅘, from Rupert House, Ungava, *Dutilly & Lepage*, no. 14,032; fig. 3, fruiting ament, × ⅘, from no. 14,032; fig. 4, portion of unexpanded staminate ament, showing blackish bracts, × 10, from no. 14,002; fig. 5, portion of expanded staminate ament, × 10, from no. 14,002. Plate 1000: fig. 1, fruiting branch, × 1, from Wellington, Ontario, June 3, 1902, *James Fowler*, as *S. adenophylla;* fig. 2, lower surface of mature glabrate leaf, showing delicate venation, × 10, from Michaux's type-region, Ile-aux-Couleuvres, Lake St. John, Quebec, *Victorin*, no. 16,371; fig. 3, portion of immature pistillate ament, to show short pedicels, × 10, from Rupert House, *Dutilly & Lepage*, no. 14,032.

Plates 1001 and 1002, S. syrticola Fernald. Plate 1001, both figs., from type, Lake Michigan, near Chicago, *Bebb*, Herb. Sal. no. 2, as *S. adenophylla:* fig. 1, pistillate, and fig. 2, staminate branch, × ⅘. Plate 1002: fig. 1, portion of stipule, petiole and leaf-base, × 5, from Saugutuk, Michigan, August 15, 1896, *C. F. Wheeler;* fig. 2, petiole and leaf-base, × 5, from Dune Park, Indiana, *Umbach*, no. 95; fig. 3, portion of stipule, × 5, from no. 95; fig. 4, lower surface of mature leaf, showing venation, × 10, from New

Buffalo, Michigan, *Lansing*, no. 3265; FIG. 5, portion of flowering pistillate ament, × 5, from TYPE; FIG. 6, portion of staminate ament, × 5, from TYPE.

PLATES 1003 and 1004, S. RETICULATA L. and var. SEMICALVA Fernald. PLATE 1003: FIG. 1, portion of staminate ament, showing villous-based and blackish bracts, × 10, of typical S. RETICULATA from Dovre, Norway, *W. Boeik* (?). FIGS. 2–4, var. SEMICALVA: FIG. 2, portion of TYPE, × 4/5; FIG. 3, staminate ament and lower surface of leaf, × 3, from TYPE; FIG. 4, portion of staminate ament, showing pale and glabrous bracts, × 10, from TYPE. PLATE 1004, FIG. 1, portion, × 10, of fruiting ament of the typical S. RETICULATA from Torne Lappmark, July 19, 1927, *Samuelsson & Zander*. FIGS. 2–4, var. SEMICALVA, all from Gargamelle Cove, Ingornachoix Bay, Newfoundland, *Fernald, Long & Fogg*, no. 1580: FIG. 2, fruiting plant, × 4/5; FIG. 3, fruiting ament, × 5; FIG. 4, portion of latter, to show pale glabrous bracts and sparsely pubescent capsules, × 10.

PLATE 1005, S. LEIOLEPIS Fernald, all figs., from TYPE: FIG. 1, portion of plant, × 1; FIG. 2, branchlet and portions of leaves, × 5; FIG. 3, portion of ament, to show glabrous bracts and capsules, × 10.

PLATE 1006, S. JEJUNA Fernald: FIG. 1, two portions of type, × 1; FIG. 2, a denser plant, × 1, from Four-Mile Cove, Straits of Belle Isle, Newfoundland, *Fernald, Wiegand & Long*, no. 27,949; FIG. 3, branch, × 1, showing 2nd flowering in midsummer, from east of Big Brook, Straits of Belle Isle, Newfoundland, July 16, 1925, *Fernald, Wiegand & Hotchkiss*, no. 27,986; FIG. 4, expanding bud and stipule, × 10, from no. 27,986; FIG. 5, fruiting ament and leaf, × 5, from no. 27,949; FIG. 6, portion of same ament, showing villous bracts and capsules, × 10.

III. NOMENCLATURAL TRANSFERS IN POLYGONUM

POLYGONUM AMPHIBIUM L., var. STIPULACEUM Coleman, forma **hirtuosum** (Farwell), comb. nov. *P. amphibium*, var. *marginatum*, forma *hirtuosum* Farwell in Papers Mich. Acad. Sci. i. 93 (1923).

P. AMPHIBIUM, var. STIPULACEUM, forma **simile,** f. nov., terrestre vel subterrestre, ramis adscendentibus glabris vel minute pubescentibus; ochreis cylindricis; foliis lanceolatis, breviter petiolatis. TYPE from moist open meadow, Lisbon, New York, June 25, 1916, *O. P. Phelps*, no. 1551 (in Herb. Gray).

P. AMPHIBIUM, var. STIPULACEUM, forma **fluitans** (Eaton), stat. nov. *P. amphibium*, var. α. *natans* Michx. Fl. Bor.-Am. i. 240 (1803), not Moench, Enum. Pl. Hass. 189 (1777). *P. natans* (Michx.) Eaton, Man. ed. 3: 400 (1822). *P. amphibium*, var. *aquaticum* Torr. Fl. No. Mid. U. S. i. 404 (1824), not Leysser, Fl. Hals. ed. alt. 95 (1783). *P. fluitans* Eaton, Man. ed. 6: 274 (1833). *Persicaria fluitans* (Eaton) Greene, Lfts. i. 26 (1904).

IN RHODORA, xxvii. 125–130, 146–152 and 156–166 (1925) Stanford discussed very clearly the heteromorphic series which at various times and by various authors has been treated as *Polygonum amphibium* L., his conclusions including, among other points, the segregation of the aquatic plant with thick and relatively short spikes and glabrous peduncles as a strictly North

American species, *P. natans* (Michx.) Eaton, with terrestrial phases. His main arguments for separating these from the Eurasian *P. amphibium* were the facts that in America the terrestrial form often has the summit of the ochrea flaring into a horizontally divergent foliaceous and bristly-ciliate flange, which does not occur in the Old World; that the terrestrial forms of the American plant have a less harsh leaf-margin; that the floating leaves of the American plant are more elliptic or elliptic-oval than in that of the Old World; that in true *P. amphibium* "the lateral veins of mature leaves [are] nearly straight and meeting the mid-vein nearly at right angles", whereas in the American *P. natans* they are more curved and meet "the midvein at an angle of about 60°" (*Stanford*, pp. 157, 158); and the ochreolae of *P. natans* are narrower and more tapering than in true *P. amphibium*. Other differences, measurements of achenes, calyx, etc., break down in the two series and the angle by which the veins join the midrib proves to vary too much in both series. So far as I can make out the really significant differences are the more lance-oblong or narrowly trowel-shaped leaf in *P. amphibium*, the harsher and shorter pubescence of the terrestrial foliage, the broader ochreolae and the more slender and often more elongated spike of the Eurasian series, with a tendency to longer peduncles. These are all relative characters, whereas the flowers and achenes are so similar that I am forced back to the long-established uniting of the two series as a single circumboreal species, *P. amphibium* L.

The North American variety cannot take the first varietal name given it, *P. amphibium*, var. α. *natans* Michx. (1803), nomenclatural basis of *P. natans* (Michx.) Eaton (1822), for there was already a var. *natans* Moench (1777) for the floating-leaved European plant. The next varietal name for our plant, *P. amphibium*, var. *aquaticum* Torr. (1824) likewise duplicated an identical name given the aquatic European plant in 1783. Singularly enough, the first available varietal name for the American series seems to be one applied to the most distinctively American phase of the species, var. *stipulaceum* Coleman, Cat. Fl. Pl. S. Pen. Mich. 32 (1874). Since Coleman's work is a relatively scarce one I here give his account: Under *P. amphibium* he had the conventional var. *aquaticum*, ascribed to

Linnaeus, with *P. fluitans* Eaton as a synonym, and var. *terrestre* Willd. Then came

> Var. stipulaceum, with leaves and flowers like *P. amphibium;* the leaves, possibly a little narrower, and with salver form stipules, like *P. orientale,* found growing in sandy soil near Gd. Rapids.

That was a clear description of the distinctively North American terrestrial plant which had been described as *P. Hartwrightii* Gray in Proc. Am. Acad. viii. 294 (1870), the plant subsequently called *P. amphibium,* var. *Hartwrightii* (Gray) Bissell in Rhodora, iv. 104 (1902) and *P. natans* (Michx.) Eaton, forma *Hartwrightii* (Gray) Stanford in Rhodora, xxvii. 160 (1925). As the first valid varietal name, var. *stipulaceum* has to be taken up to include the many vegetative American forms. This might seem to those who think of the American plant as the aquatic phase with oblong long-petioled floating leaves, which, becoming stranded, will change rapidly to the terrestrial phases, like putting the cart before the horse. The floating transmutation, however, is the exceptional one. Over much of the area, where lakes and ponds are scattered, the terrestrial var. *stipulaceum* occupies thousands and thousands of square miles of swamp, meadow and swale, where it makes vast carpets and never gets the opportunity to stretch into permanently standing water. To those who know such extensive areas var. *stipulaceum* seems the normal development of the species.

As to var. *stipulaceum,* forma *simile,* that plant of swale, meadow and shore, although simulating the Old World *P. amphibium,* forma *terrestre* (Leers) Blake in Rhodora, xv. 164 (1913) and Moss, Camb. Brit. Fl. ii. 115 (1914), which was based nomenclaturally on *P. amphibium,* var. *terrestre* Leers (1775), is really a parallel form of var. *stipulaceum* without the foliaceous flanges.

It is in some ways fortunate that the name *P. fluitans* Eaton is available as a nomenclatural basis for the formal name of the common lacustrine extreme of the species in America, the *P. natans* (Michx.) Eaton, forma *genuinum* Stanford in Rhodora, xxvii. 158 (1925), for, since the varietal names given this extreme by earlier authors were later homonyms, we should be faced by a large handful of Greene's so-called species and might have to transfer to the formal category for the common aquatic plant

growing from Labrador to Alaska and south into the Northeastern, Central and Western States one of several inappropriate binomials, such as *Persicaria purpurata* Greene, *P. mesochora* Greene or *P. oregana* Greene.

Amos Eaton started off his *Polygonum fluitans* (1833) in a somewhat contradictory manner. In 1822 he had published *P.* "*natans* (floating knotweed)" from "Whiting's pond, 5 miles south of New Lebanon springs", saying definitely "It is the P. amphibium. Var. natans of Mx". In 1833, however, he changed his mind, renaming the plant of Whiting's Pond *P.* "*fluitans*, Ea. . . swimming knotweed" and saying "Finding this to be a new one, not var. *natans* of Mx. I give it a new name." There is nothing about the lacustrine plant of western Massachusetts and adjacent eastern New York (TYPE-region) to separate it from Michaux's *P. amphibium*, var. *natans* from Lake St. John, Quebec, as shown by the photograph of it before me. And even Greene, who saw many species where others see only one, admitted the probable identity, saying in his typically sophisticated and plausible style, under his *Persicaria fluitans* (*Polygonum fluitans* Eaton):

"Amos Eaton as early as 1840 [*i. e.* 1833] gave the name *P. fluitans* to what, from the description as well as the locality, we must conclude to have been that here described anew. I do not know where that St. John's Lake is which Michaux cites as the habitat of his var. *natans;* but I suspect it to be some northern lake now known by another name, and lying within the habitat of *P. fluitans*, in which case that may be an older, though a merely varietal designation which would in my view be of no consequence."

Since Michaux's *Polygonum amphibium*, var. *natans* was the nomenclatural basis of *P. natans* (Michaux) Eaton (1822), the plant later (1833) becoming *P. fluitans* Eaton, Greene's dismissal of the name *natans* as "merely a varietal designation" showed woeful lack of knowledge of the literature for a self-styled historian. So did his ignorance of "Where that St. John's Lake is which Michaux cites", for the big Lake St. John, lying at the head of the Saguenay, in the Districts of Lake St. John and Chicoutimi, was on the old route of early explorers from the lower St. Lawrence to Hudson Bay, was much mentioned by

Photo. B. G. Schubert

XYRIS BAYARDI, all figs. from TYPE: FIG. 1, four plants, × 1; FIG. 2, two spikes, × 5; FIG. 3, leaf-tip, × 10; FIGS. 4 and 5, lateral sepals, × 10; FIG. 6, four seeds, × 10.

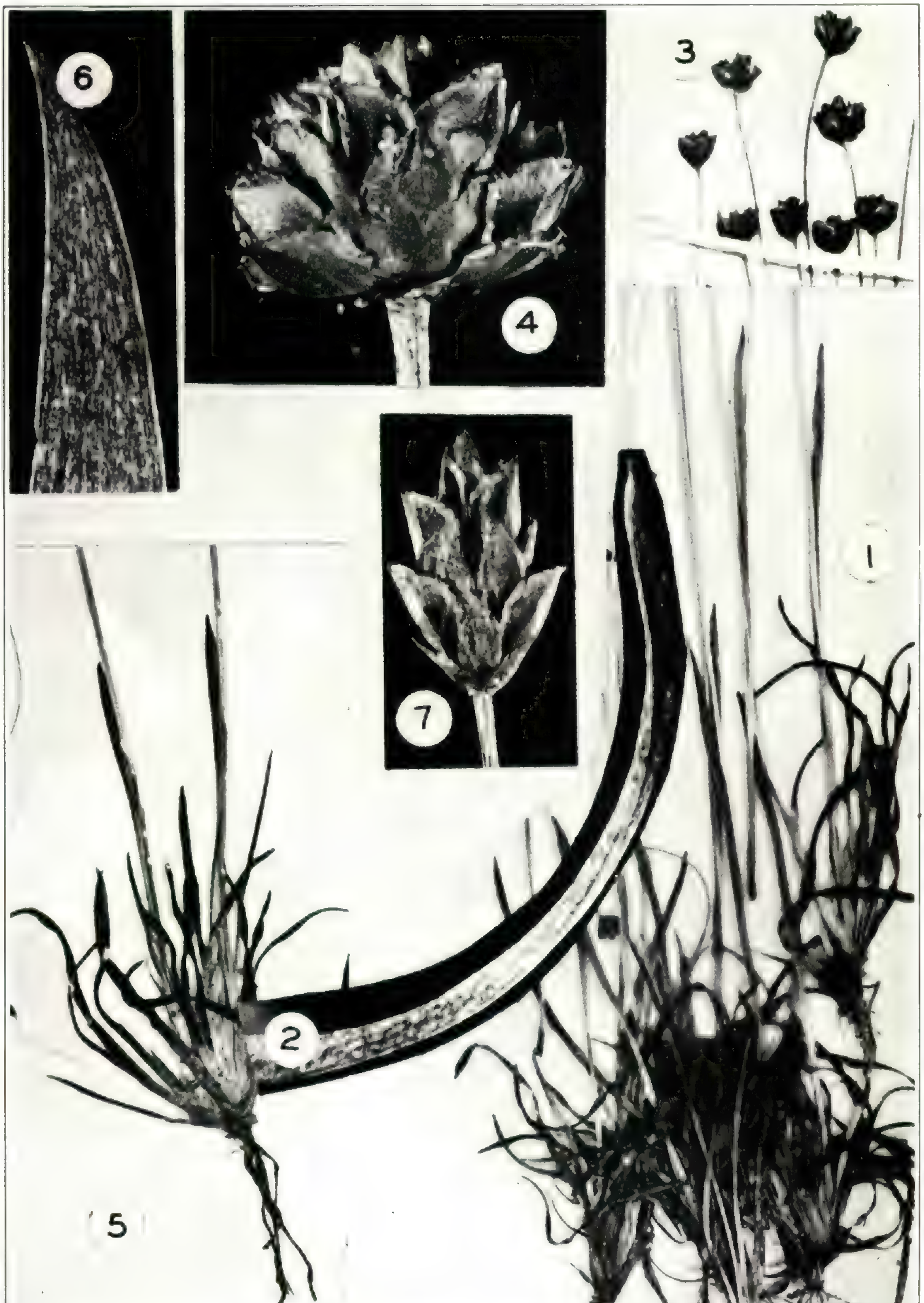

Photo. B. G. Schubert

XYRIS BREVIFOLIA: FIG. 1, bases of plants, × 1, from TYPE-REGION; FIG. 2, basal leaf, × 10; FIG. 3, group of spikes, × 1, from Michaux's TYPE, after photo. by *Cintract;* FIG. 4, spike, × 5.

X. FLABELLIFORMIS, all figs. from ISOTYPE: FIG. 5, base of plant, × 1; FIG. 6, tip of leaf, × 10; FIG. 7, spike, × 5.

Michaux in his journals of exploration and was repeatedly cited as the type-locality of plants described by him, and it is shown (and named), almost north from the city of Quebec, as a roundish blue spot on all maps of Canada, or even of North America, which I find in recent atlases. Nevertheless some botanists express admiration of Greene and his methods.

P. ARIFOLIUM L., var. **pubescens** (Keller), comb. nov. *P. sagittatum*, var. *pubescens* Keller in Bull. Soc. Roy. Bot. Belg. xxx². 45 (1891). *P. arifolium*, var. *lentiforme* Fernald & Griscom in RHODORA, xxxvii. 167 (1935).

It is too bad to be forced to abandon a diagnostically descriptive name, var. *lentiforme* (from the lenticular achene), for a non-distinctive one, since both typical southeastern *Polygonum arifolium* and the northern var. *pubescens* (or *lentiforme*) are pubescent, the former much more so than the latter.

When Dr. Robert Keller described the northern variety as a pubescent variety of *P. sagittatum*, in a paper entitled *Remarques sur quelques espèces du genre Polygonum de l'Herbier de Jardin Botanique de l'État à Bruxelles*, he unwittingly indicated the weakness of that famous herbarium in representative North American material and, incidentally, unfamiliarity with the standard floras and manuals of eastern North America, in which the Linnean *P. arifolium* (1753) was described with the pubescent, large, long-acuminate leaves and the hispid-glandular axis of the inflorescence which set off Keller's *P. sagittatum*, var. *pubescens* (a single specimen from Troy, New York) as "une variété bien caractérisée" of his true *P. sagittatum*, defined "*foliis sagittato-lanceolatis nudis vel margine setulis ciliolatis subtus nervo inermi vel plus minusve aculeolato*"; var. *pubescens* "foliis sagittatis late ellipticis, longe acuminatis, . . . subtus in nervo medio nervisque secundariis aculeolatis, foliis infra densius pubescentibus pilis stellatis supra parce pubescentibus pilis simplicibus adpressis pilisque stellatis".

As early as 1788 Walter described *P. arifolium* "foliis hastatis pilosis magnis"; Elliott (1817) knew its stem "towards the summit with capitate hair and a stellated pubescence. *Leaves* on long petioles, hastate, with the auricles acute, pubescent"; Torrey (1824) knew its "*Leaves* on long aculeate petioles . . . acuminate, with short scattered hairs on the upper surface,

minutely papillose beneath" and to these characters he added in Fl. N. Y. (1843) "peduncles glandularly hispid". Even if Keller did not know these and the more detailed American treatments of succeeding years he might have found Meisner in his Monograph (1826) defining *P. arifolium* "foliis hastatis acuminatis, utrinque adpresse pilosis", these characters repeated in Meisner's treatment in DeCandolle's Prodromus (1856), with the other distinctive character of Keller's *P. sagittatum*, var. *pubescens*, "pedunculis subglanduloso-hispidulis". Had Keller looked further he would doubtless have found that the flowers of the latter have 6 stamens and bifid style (the achene, consequently, biconvex), whereas his true *P. sagittatum* would have shown him 8 stamens and a trifid style (consequently a trigonous achene).

Since the type and only specimen cited by Keller came from Troy, New York, it is obviously of the less pubescent northern plant which Griscom and I described as *P. arifolium*, var. *lentiforme*, we not imagining anyone in these days referring members of that long and generally understood species to the very different *P. sagittatum*. Even the most inexperienced of our "lumpers" would hardly argue for the specific uniting of *P. sagittatum* and *P. arifolium*, provided, of course, that he knew the plants and their morphological characters.

P. cilinode Michx., forma **erectum** (Peck), stat. nov. Var. *erectum* Peck, N. Y. State Mus. Rep. xlvi. 129—repr. 49 (1893). Var. *breve* Peck, Bull. N. Y. State Mus. vi. 120 (1899).

The low and upright plants ending in panicles and without twining tips, comparable with bush-beans, as contrasted with twiners.

IV. Novelties in our Flora

(Plates 1007–1020)

Carex crinita Lam., var. **brevicrinis,** var. nov., a var. typica recedit spicis foemineis 4–10 (plerumque 6–7) cm. longis densifloris omnino foemineis vel ad apicem masculis; squamis imis perigyneis aequantibus ad duplo longioribus, squamis superioribus perigyneis vix aequantibus ad paulum longioribus; perigyneis valde inflatis 3–4 mm. longis 2–3 mm. latis.—North Carolina to eastern Texas, north to southern New England, Kentucky and Missouri. The following are characteristic. Massachusetts: edge of cedar swamp, southwest of Beachwood,

Cohasset, July 22, 1938, *Griscom & Svenson* (as *C. Mitchelliana*); maple swamp, Spring Hill, Harwich, July 30, 1919, *Fernald & Long*, no. 18,127 (as *C. Mitchelliana*). RHODE ISLAND: Providence, May, 1845, *Thurber*. CONNECTICUT: Bridgeport, June 8, 1910, *H. S. Clark;* New Fairfield, July 19 and 20, 1912, *Blewitt*. DISTRICT OF COLUMBIA: May 30, 1899, *Steele;* May 22, 1890, *Steele* (as var. *gynandra*). VIRGINIA: sphagnum swamp, 1½ miles northwest of Williamsburg, June 12, 1921, *Grimes*, no. 3693; Powhatan Swamp, ½ mile southwest of Five Forks, James City Co., June 20, 1922, *L. F. & F. R. Randolph;* sphagnous boggy margin of spring-fed pond, Century House, northeast of Burgess, Dinwiddie Co., July 23, 1938, *Fernald & Long*, no. 8614; wooded alluvial bottomland of Rowanta Creek, near Rowanta, Dinwiddie Co., June 8, 1938, *Fernald & Long*, no. 8413 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); inundated swamp along Quarrel Creek, "Chamblis bigwoods", Seward Forest, near Triplett, Brunswick Co., May 10, 1945, *Fernald*, no. 14,795. NORTH CAROLINA: swamp, edge of Newbridge Creek, 2 miles from Currituck Sound, Currituck Co., July 1, 1922, *Randolph & Randolph;* marsh, Lake Raleigh, Wake Co., May 11, 1937, *Godfrey;* low field, 7 miles northwest of Chapel Hill, June 28, 1927, *Wiegand & Manning*, no. 414. KENTUCKY: without stated locality, *Short* (as *C. Pseudo-Cyperus*, this corrected by Dewey). TENNESSEE: low, wet grounds, Wolf Creek, August 15, 1900, *Ruth*, no. 497. MISSOURI: rare in low ground, Courtney, May 25, 1902, *Bush*, no. 1714. LOUISIANA: western section, *Hale*. TEXAS: without stated locality, *Wright*.

Carex crinita, var. *brevicrinis* has puzzled its collectors. Some of the northern collections were placed with the then recently redefined *C. Mitchelliana* M. A. Curtis[1], because they would not go satisfactorily into typical *C. crinita*, in which the pistillate spikes only rarely have staminate tips, the long awns of the lower scales are two to three or four times as long as and the upper awns definitely longer than the relatively small perigynia (2–3-rarely 3.5 mm. long and 1–2 mm. broad). Var. *brevicrinis* most often has the pistillate spikes with a staminate tip (as frequently in var. *gynandra* (Schwein.) Schwein. & Torr.), its lower scales are rarely twice as long and the upper ones shorter than to barely longer than the large and strongly inflated, mostly obovate perigynia, these 3–4 mm. long and 2–3 mm. broad.

Although superficially suggesting var. *gynandra*, the usually more southern or coastwise var. *brevicrinis* differs at once in its

[1] See Weatherby in RHODORA, XXV. 17–20 (1923).

smooth lower leaf-sheaths (those of var. *gynandra* being harsh), in its relatively longer lower foliaceous bract, in its relatively shorter scales and in its more strongly inflated and crumpled perigynia. In the relatively northern and upland var. *gynandra* the lowest foliaceous bract ranges from 1.2–4 (av. 2.5) dm. long, this averaging twice the length of the axis of the inflorescence. In var. *brevicrinis*, on the other hand, the lowest bract is from (2.5–) 3–4 (av. 3.6) dm. long, this averaging three and a third times the length of the axis of the inflorescence.

Although *Carex crinita*, var. *brevicrinis* has been mistaken for *C. Mitchelliana*, it is really very different. *C. Mitchelliana* has the leaves and lower foliaceous bract only 2.5–9 mm. broad (in var. *brevicrinis* thinner and darker, 6–12 mm. broad) the lower bract 0.8–3 (av. 1.8) dm. long; the tight or scarcely inflated and definitely nerved granular-papillate ovate to ovate-lanceolate perigynia 2.5–3.5 mm. long and only 1.4–2 mm. broad.

Xyris (§ Brevifoliae) **Bayardi,** sp. nov. (tab. 1007). Planta annua vel biennis; foliis pallide viridibus lanceolato- vel linear-ensiformibus 1.5–4 cm. longis ad 4 mm. latis, plus minusve curvatis, membranaceis, margine albido minute denticulato, apice subacuto breviter curvato; scapis filiformibus 1–3 dm. altis glabris; vaginis basilaribus scapi perbrevibus brunneis; spicis paucifloris ellipsoideo-ovoideis acutis vel subacutis 5–6 mm. longis 3–4.2 mm. crassis; bracteis intermediis elliptico-ovalibus brunneis margine albido-hyalinis, area dorsali viridi distincta; sepalis lateralibus liberis curvatis oblique lineari-lanceolatis 3–3.5 mm. longis 0.3–0.5 mm. latis, ala carinali angustissima in parte tertia superiore minute denticulatis; seminibus ellipsoideo-fusiformibus 0.45–0.5 mm. longis 0.2–0.24 mm. latis, pallide stramineis apicibus brunneis.—Sussex County, Virginia: wet sandy and peaty shore of Airfield Millpond, southwest of Wakefield, September 11, 1945, *Fernald & Long*, no. 14,922 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

Xyris Bayardi (for one of its discoverers, Bayard Long) is the northernmost member of *Xyris* § *Brevifoliae*, only three other members of this chiefly tropical section, mostly annuals and biennials, being known in the United States. From all three *X. Bayardi* is abundantly distinct. The basic *X. brevifolia* Michaux, Fl. Bor.-Am. i. 23 (1803), shown in our pl. 1008, figs. 1–4, described from the low country of Georgia, is rare except in Florida. Its firm leaves (figs. 1 and 2) are very narrowly linear

(1–2 mm. wide), arching to long attenuate tips, firm and glabrous-margined; whereas the very thin and membranaceous leaves of *X. Bayardi* are broader (up to 4 mm. broad), with short and barely acutish tips, the white margin minutely denticulate. The sheaths at the base of the scape in *X. Bayardi* are so short as scarcely to be seen, while in *X. brevifolia* (FIG. 1) they are prolonged and commonly much overtopping the basal foliage. The fruiting spike of *X. Bayardi* is ellipsoid and acute or acutish and only 3–4.2 mm. thick; whereas *X. brevifolia* (FIG. 3, × 1, from the Michaux TYPE) has the mature spikes oblate or depressed-globose and broad-tipped, finally 6–8 mm. thick. The very narrow (0.3–0.5 mm.) lateral sepals of *X. Bayardi* are minutely denticulate only toward the summit of the keel; the broader (0.6 mm.) sepals of *X. brevifolia*, to quote Malme in the North American Flora, have the "keel ciliate-scabrid from near the base to the apex". At its type-station (the only one yet known) *X. Bayardi* was mature, but with lingering marcescent corollas, on September 11th. Whether it begins flowering before summer we do not yet know. It is significant, however, that most of the material of *X. brevifolia*, whether in flower or in fruit, from Florida was collected in March, April and May, only exceptionally up to midsummer.

A second annual species, occurring from Florida to Mississippi, is *Xyris flabelliformis* Chapman, Fl. So. U. S. 499 (1860), our PL. 1008, FIGS. 5–7. *X. Bayardi* has flabelliform clusters of basal leaves as in Chapman's species, but they are thinner, paler, broader and blunter than in *X. flabelliformis*, and with minutely denticulate, instead of entire margins. Furthermore, the basal sheaths of *X. flabelliformis* run up the scape (FIG. 5), while in *X. Bayardi* they are almost hidden. The spike of *X. Bayardi* might be taken for that of *X. flabelliformis* (FIG. 7) but its bracts are broader, more appressed and more rounded at tip. *X. Bayardi* can hardly be forced into *X. flabelliformis*.

The only other species of § *Brevifoliae* described from north of the Tropics is *X. Drummondii* Malme from Alabama, described as a perennial with smooth leaves, sheaths extending up the scape, and lateral sepals 0.8 (in *X. Bayardi* 0.3–0.5) mm. broad and ciliate-scabrous on the keel. I have seen no material but it can hardly be made to include *X. Bayardi*.

It was only by the rarest of good luck that *Xyris Bayardi* was discovered. Mr. Long's and my discovery that in Sussex and Southampton Counties, Virginia, there are at least two large ponds (Airfield in Sussex, Whitefield in Southampton) which we had not previously known and which, during a dry season, have broad sandy and peaty beaches, was recounted in Rhodora, xlv. 372 and 373 (1943). We discovered these ponds with their broad beaches (then "perhaps 50 feet wide up to the bushes") in early July, 1942. Then gasoline-rationing cut us off from working them. Two futile attempts (after heavy rains) were made by me to explore them later (see Rhodora, l. c. 381 and xlvii. 103–105), so that the end of gasoline-rationing was the signal for Long and me to hurry to our headquarters at Waverly and to try, in September last, for the pond-shores. Again alas! An abnormally rainy summer had completely overflowed Whitefield Pond, Brittle's showed no beach, but on September 11th and 12th a very narrow rim, still wet from drowning, was visible at Airfield, this very soon obliterated by more rain. Luckily we got there in time for preliminary exploration of the little emersed belt of shore. Here had been the only known station for *Rhynchospora filifolia* between southeastern North Carolina and Cape May, New Jersey; that and other species collected in early summer indicated an unusual pond-shore for eastern Virginia. The southern shore of Airfield is the best we saw, the northern being more uniformly pretty swaley, with *Panicum verrucosum*, *Cephalanthus occidentalis*, *Xyris caroliniana*, *X. ambigua* Beyrich (in all sizes) and other aggressive plants crowding out all others. Immediately we got *Sabatia difformis* (L.) Druce, the first from between North Carolina and eastern Maryland. Then *Eriocaulon decangulare*, very local in Virginia. *Psilocarya nitens*, previously unknown between southeastern North Carolina and Cape May was locally abundant; and we were (and still are) utterly baffled by the members of the alliance of *Hypericum canadense*. I had thought that I had this series under control, but its behavior on the peaty shore of Airfield Pond is seriously disturbing the latest treatments. I may stave off the evil day until another season of observation. And here, nestled among the coarser vegetation were the whitish-green fan-like tufts of a tiny annual *Xyris:* the newly described *X. Bayardi*. We saw it in only one small area, a few rods wide, but

further exploration another season, when the water is much lower, will, we hope, reveal it in quantity. Airfield Pond still needs a season of intensive botanizing!

PEDICULARIS CANADENSIS L., var. **Dobbsii,** var. nov. (TAB. 1010 et 1009, FIG. 2 et 3), vix cespitosa, caudicibus lateralibus horizontaliter divergentibus elongatis plus minusve repentibus.—New York to Minnesota, south to northern Florida, Alabama, Louisiana and eastern Texas. The following are characteristic. NEW YORK: along Babcock Trail near Jim Pond, Black Rock Forest, Orange Co., *Raup*, no. 7215; Taughannock Ravine and vicinity, Ulysses, *F. P. Metcalf*, no. 7148. NEW JERSEY: Columbus, Burlington Co., May 11, 1921, *H. B. Meredith.* WEST VIRGINIA: along East Fork of Greenbrier River, Pocahontas Co., *Greenman*, no. 252. NORTH CAROLINA: Highlands, May 27, 1901, *E. E. Magee.* FLORIDA: without statement of locality, *Chapman.* ONTARIO: Tobermory, Bruce Co., *Krotkov*, no. 7771. MICHIGAN: Carp Creek, Cheboygan Co., *Ehlers*, no. 392. INDIANA: Jackson Tp., Wells Co., May 11, 1908, *Deam.* TENNESSEE: oak barrens, 7 miles east of Crossville, Cumberland Co., May 13, 1933, *C. A. & Una F. Weatherby*, no. 6254 (TYPE, in Herb. Gray); Jackson, *Bain*, no. 442. ALABAMA: about 3 miles north-northeast of Marion, Perry Co., *Harper*, no. 3702. WISCONSIN: Preble, Brown Co., May 19, 1887, *J. H. Schuette.* ILLINOIS: Mt. Morris, May 20, 1909, *Sherff;* about ½ mile east of western boundary of Henry County and ¼ mile south of U. S. Route 6, July 1, 1945, *Raymond J. Dobbs.* MINNESOTA: Clearwater Co., *M. L. Grant*, no. 2702; Spring Grove, *Rosendahl*, no. 276. IOWA: Homestead, Iowa Co., May 11, 1925, *Shimek.* ARKANSAS: Little Rock, *Demaree*, no. 18,795. LOUISIANA: Perkins, Calcasieu Parish, *Pennell*, no. 10,212. KANSAS: Leavenworth Co., *Hitchcock*, no. 788. OKLAHOMA: Arkansas National Forest, Sebastian Co., *E. J. Palmer*, no. 39,309. TEXAS: Camp Fannin, 8 miles northeast of Tyler, Smith Co., *H. E. Moore, Jr.*, no. 673.

Var. *Dobbsii*, which was called to my attention by Mr. RAYMOND JOSEPH DOBBS of Geneseo, Illinois, keen student of the flora of Henry County, is a striking departure in habit from the densely cespitose typical *Pedicularis canadensis* (PLATE 1009, FIG. 1). At the northeastern corner of the range of *P. canadensis*, whence, undoubtedly, came Kalm's material which was described by Linnaeus, the densely crowded crowns are erect or strongly ascending (PLATE 1009, FIG. 1) and the large series before me from southern Quebec and New England shows no appreciable tendency to the lax to stoloniferous habit of var. *Dobbsii*. The densely cespitose extreme also extends westward and southward

essentially to the limits of the specific range, except for the more western var. *fluviatilis* (Heller) Macbride, and it is general in the large New England series before me; it is evidently the only variety occurring in this area. Whether var. *Dobbsii* has a different habitat and whether it more generally has fusiform roots (as in the type) are matters for close field-observation. Such fusiform roots are apparently rare in typical *P. canadensis*—perhaps only seemingly so through careless collecting.

Utricularia juncea Vahl, forma **virgatula** (Barnhart), stat. nov. *U. virgatula* Barnhart in Bull. Torr. Bot. Cl. xxxiv. 580 (1908). *Stomoisia virgatula* (Barnhart) Barnhart in Britton & Brown, Ill. Fl. ed. 2, iii. 232, fig. 3875 (1913).

Ever since I first began collecting with him in Virginia Mr. Bayard Long has insisted that *Utricularia juncea* and *U. virgatula* are phases of one species, comparable with *U. subulata* L. and its forma *cleistogama* (Gray) Fernald in Rhodora, xxiii. 291 (1922). Although we usually find *U. virgatula* growing with *U. juncea* I have been reluctant to merge them; but on the shore of Airfield Millpond in Sussex County, Virginia we found in September last such perfect intergradation in all the large areas of the plants between large-flowered *U. juncea* and small-flowered *U. virgatula*, that I give up. Only by arbitrary sorting and very arbitrary exclusion of many intermediates can two piles of similar specimens be made. By this doubtful process some of our earlier collections have been forced apart. It is significant, therefore, that many numbers in the Gray Herbarium show that their collectors did not mechanically sort them into two or three piles: *J. A. Allen* from Atsion, New Jersey, Aug. 16, 1879, with smallest and transitional corollas; *Commons*, Laurel, Delaware, Aug. 19, 1880, both large and smallest corollas; *R. R. Tatnall*, no. 2759 from Kent Co., Delaware, large and intermediate corollas, the latter *U. juncea*, forma *minima* Blake in Contrib. Gray Herb. no. lii. 89 (1917); *Heller*, no. 1222 from Princess Anne Co., Virginia, both typical *U. juncea* and forma *virgatula;* and so on to Mississippi. The experience at Airfield Millpond finally convinced me.

Chrysopsis mariana (L.) Ell., forma **efulgens,** f. nov. ligulis nullis.—Sussex County, Virginia: dry pine woods, State Game Sanctuary, northwest of Newville, Sept. 13, 1945, *Fernald & Long*, no. 14,996 (type in Herb. Gray., isotype in Herb. Phil. Acad.); dry pineland 3–4 miles west of Waverly, Sept. 16, 1945, *Fernald & Long*, no. 14,997.

(*To be continued*)

Photo. B. G. Schubert

PEDICULARIS CANADENSIS: FIG. 1, plant, × ⅔.
P. CANADENSIS, var. DOBBSII: FIG. 2, characteristic base, × ¾; FIG. 3, flowering raceme, × 1.

Photo. B. G. Schubert

PEDICULARIS CANADENSIS, var. DOBBSII, both figs. from TYPE: FIG. 1, base of plant, showing fusiform roots (center), × ⅔; FIG. 2, fruiting raceme, × 1.

SOME OBSERVATIONS ON TWO ECOLOGICAL RACES OF ALLIUM TRICOCCUM IN KALAMAZOO COUNTY, MICHIGAN

Clarence R. Hanes and Marion Ownbey

Repeated observations on *Allium tricoccum* Ait. both in the wild and in the garden have revealed the existence of two well-defined ecological races of this species in Kalamazoo County, Michigan. One race prefers low moist woodlands, where a single patch may often occupy several acres of low ground. The other is found, usually, in small scattered patches only, in upland beech and maple woods. The two races rarely, if ever, occur together. For convenience in the following discussion they are referred to as "Race A" and "Race B", respectively.

Race A.—Plants of Race A are in every way conspicuously larger than are those of Race B, both in the wild and under cultivation. The leaf-blades vary from 22 to 26 cm. long, and from 4 to 7 cm. broad, and are more nearly elliptic in outline than are those of Race B. The sheaths and well-developed petioles are reddish, and the scape is from 25 to 34 cm. tall. From herbarium specimens, and from descriptions in existing manuals, it appears that this is the common race eastward, and, therefore, likely the typical element of the species.

In Kalamazoo County, Race A is very abundant in Section 20, Prairie Ronde Township, where it occurs with swamp birch, tamarack, white elm, red ash, etc. It also occurs in moist soil in sections 14 and 33, Climax Township, in Section 19, Brady Township, and along the Kalamazoo River in sections 27 and 28, Comstock Township. At Cooper's Glen, north of Kalamazoo (Section 27, Cooper Township), it grows on a wooded hillside which may be somewhat springy.

Race B.—The leaf-blades of Race B vary from 20 to 22 cm. long, and from 1.3 to 3 cm. broad. They are more lanceolate than elliptic in outline. The sheaths and petioles are greenish, and the latter are often very short. The scape is less than 25 cm. tall.

Race B occurs principally in upland woods of beech and maple. It has been found in sections 4, 5, 16, 19, 22, 24, 26, and 30, Prairie Ronde Township, and in Section 18, Schoolcraft Township. Mostly, it occurs on the western side of the county. In Section 30, Prairie Ronde Township, only, has it been observed

to occur in marshy ground. It grows also in Porter Township, Van Buren County.

In localities where Race B is the prevalent form, occasional plants with the typical narrow leaves, but with sheaths of a slight pinkish cast, may be found. Also, among the broad-leaved plants of Race A, infrequent individuals may fail to develop the characteristic reddish color in the sheaths and petioles. This is the extent to which intermediacy or intergradation between the two races may be said to occur.

An interesting physiological difference between the two races is their differential development when grown side-by-side as they have been in the first author's garden for the last eight years. Race A appears from a week to ten days earlier in the spring than Race B, even though the weather may be continuously warm. In 1941, for instance, Race A was 2.5 cm. above the ground on April 6, whereas Race B had not yet appeared on April 13. On April 18, Race A was 21 cm. tall, while Race B stood only 9 cm.

The determination of the proper taxonomic designations for these two entities is complicated by the description in 1808 of *Allium triflorum* Raf., and the present inaccessibility of authentic material of either this or of *A. tricoccum*, if it still exists. The original description of neither is conclusive. Aiton stresses "the nude, semiterete scape, lanceolate-oblong, plane, glabrous leaves, globose umbel, and solitary seeds, while Rafinesque describes the stem as cylindrical, 3-flowered, and shorter than the plane, cuneiform, lanceolated, acute, multinervous leaves. Rafinesque states that *A. triflorum* came from North Pennsylvania, whereas North America alone is indicated as the source of *A. tricoccum*. In 1770, this would have meant only the Atlantic slope.

No systematic attempt has been made to determine the distribution of the two races outside of Kalamazoo County, although Mr. C. A. Weatherby writes that narrow-leaved specimens with no red color in the petioles from as far east as South Berwick, Maine, are preserved in the Gray Herbarium, but that these are not so extreme in these respects as is the mid-western material. Also in the Gray Herbarium, according to Mr. Weatherby, are specimens collected in 1877 by Dr. J. H. Burdick at Milton, Wisconsin, which he sent to Dr. Gray with the following descriptions:

Purple var.—No. 1	Green var.—No. 2
Leaves narrowly elliptic or elliptic-lanceolate tapering into a purple petiole (above ground) about one-third the length of the leaf, which is *bright* green and *shining*.	Leaves lanceolate, *pale* green and *glaucous*. Petiole hardly any (above ground), *white*. *There is no purple about the plant.*
Scape deep purple.	Scape pale green.

Dr. Gray and Dr. Watson were not disposed to recognize Burdick's varieties as anything more than response to environmental factors. Burdick wrote twice later, maintaining his opinion, and in one letter suggested a varietal name for the race with colored scapes. He does not seem to have published on the subject. His letters are preserved at the Gray Herbarium.

Bulbs of both races were sent to the second author in 1940, and the differences pointed out remain constant in the experimental garden at Pullman, Washington. In spite of its late start, Race B flowers several weeks in advance of Race A in the garden under Washington conditions. In Michigan, such a lag has not been noted. The differences shown by the two races are such as are frequently shown by diploid and tetraploid races of the same species, but the chromosome number of both Race A and Race B as determined by Dr. Hannah C. Aase (unpublished) is diploid, $n = 8$.

Schoolcraft, Michigan; State College of Washington.

MUHLENBERGIA SETOSA AN UNTENABLE NAME.—In his realignment of the common rhizomatous species of *Muhlenbergia* of eastern North America (RHODORA **45:** 221–239. 1943) Professor Fernald has demonstrated that the eastern plant which had for so long been passing under the name *Muhlenbergia racemosa* is amply distinct from true *M. racemosa* (Michx.) BSP. of the interior. For the eastern segregate he took up the name *Muhlenbergia setosa* (Spreng.) Trin. ex Hook. f. & Jackson, Ind. Kew **2:** 269 (1897), later (RHODORA **47:** 198. 1945) corrected to *M. setosa* (Biehler) Trin. ex Hook. f. & Jackson. There is, however, an earlier *Muhlenbergia setosa* which was overlooked by the compilers of the Index Kewensis, namely *M. setosa* (HBK.) Kunth, Rev. Gram. **1:** 63 (1829), based upon *Podosaemum setosum* HBK. Although the latter name is currently treated as a synonym of

M. microsperma (DC.) Kunth, it meets all the requirements for valid publication. *Muhlenbergia setosa* (Biehler) Trin. ex Hook. f. & Jackson is therefore a later homonym and must be replaced by *Muhlenbergia glomerata* (Willd.) Trin., a name discussed in some detail by Professor Fernald (Rhodora **45:** 232–235. 1943). This necessitates the transfer of the more northern *M. setosa* var. *cinnoides* (Link) Fernald as follows:

M. glomerata (Willd.) Trin. var. **cinnoides** (Link), comb. nov. *Dactylogramma cinnoides* Link, Enum. Hort. Berol. **2:** 248. 1833 (Rhodora **45:** 238. 1943).—F. J. Hermann, Bureau of Plant Industry Station, Beltsville, Md.

Does Habenaria cristata still grow in New England?—The only New England specimens known to me of *Habenaria cristata* (Michx.) R. Br. are three sheets in the Herbarium of the New England Botanical Club, collected by the late E. Williams Hervey on Smith's Neck, Dartmouth, Bristol County, Massachusetts, in early August of 1905 and of 1908. This is, apparently, the only station northeast of New Jersey. Is it still there?—M. L. Fernald.

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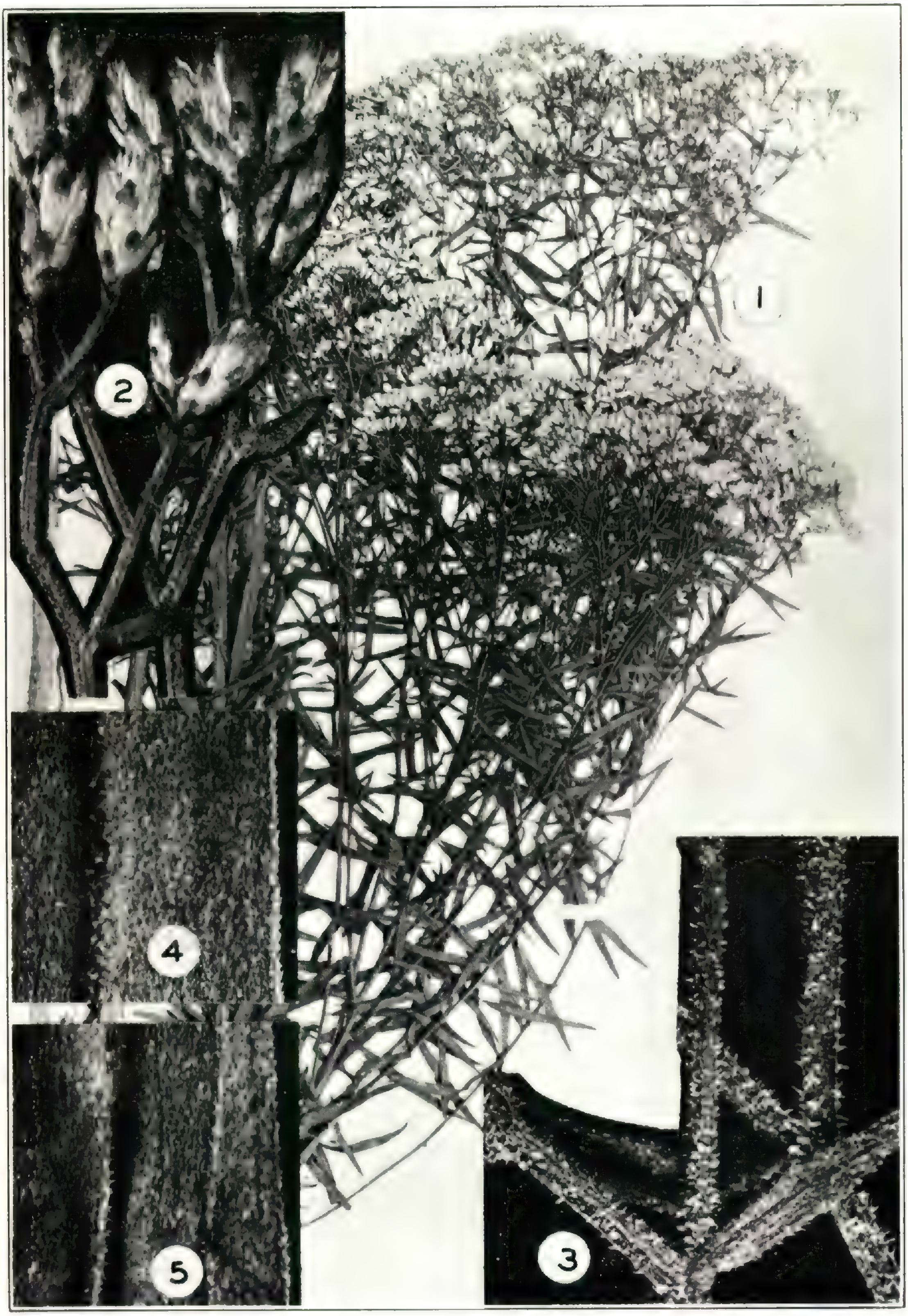

Photo B. G. Schubert

× Solidago hirtipes, all figs. from type: fig. 1, portion of plant, × ½; fig. 2, pedicelled heads, × 5; fig. 3, pedicels, × 10; fig. 4, upper, and fig. 5, lower surface of leaf, × 10.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLX

TECHNICAL STUDIES ON NORTH AMERICAN PLANTS

M. L. Fernald

(*Continued from page 60*)

× Solidago (§ Euthamia) **hirtipes,** hybr. nov. (? *S. graminifolia* (L.) Salisb., var. *Nuttallii* (Greene) Fernald × *S. microcephala* (Greene) Bush). Tab. 1011. Planta robusta ad 1.5 m. alta; foliis lineari-lanceolatis divergentibus 3–5-nerviis utrinque scabro-puberulis, in axillis plus minusve fasciculatis; foliis primariis 4–6 mm. latis; corymbo ad 4.5 dm. lato ramis valde adscendentibus, ramulis ultimis densissime griseo-hirtellis; capitulis glomerulatis vel solitariis pedicellatisque; involucro glutinoso pallido cylindrico (sicco cylindrico-turbinato) 3–4 mm. longo; phyllariis pallide stramineis apice adpresso viride.—Sussex Co., Virginia: roadside thicket about 1½ miles north of Waverly, Sept. 13, 1945, *Fernald & Long*, no. 15,015 (type in Herb. Gray; isotype in Herb. Phil. Acad.).

× *Solidago hirtipes* is a very puzzling plant, which may prove to be a fully established species. In its very broad and flat-topped corymb (with inclination to form "stories" at different heights) and in its very slender heads it at once suggests the common southern *S. microcephala* (plate 1012, figs. 4–6); but that characteristic species has the very narrow and often longitudinally folded primary leaves only 1–2 mm. broad, 1-nerved (only rarely with any trace of lateral nerves), and subtending abundant suppressed axillary branches. Its sparsely hirtellous pedicels are mostly 1-headed; while its very narrow leaves are as gray-puberulent as in × *S. hirtipes*. In its great stature, broad

3–5-nerved leaves and strong tendency to glomerulate heads the new plant is as near *S. graminifolia*, var. *Nuttallii*. In that plant (PLATE 1012, FIGS. 1–3), however, the suppressed axillary branches are few or wanting, the leaves less puberulent, the pubescence of the lower side usually confined to the ribs, the corymb with convex-topped secondary corymbs, the branchlets and pedicels as hirtellous as in × *S. hirtipes* (or even more so) but ending in densely crowded glomerules of broader and more subcampanulate heads.

I am looking upon × *S. hirtipes* as probably derived from *S. microcephala* and *S. graminifolia*, var. *Nuttallii*, though further experience may show it to be wholly separable from them. The type-colony is likely to spread; as it is, we took only selected small plants of it.

XANTHIUM **Chasei,** sp. nov. (TAB. 1013, FIG. 1, et 1014). Planta a *X. strumario* differt petiolis scabro-hispidis foliorum laminis crassis supra scabris; fructi corpore glabro vel minute puncticulato lucido olivaceo ellipsoideo-ovoideo vel subgloboso 1.3–1.6 cm. longo 6–9 mm. crasso, rostris basin versus crassis glanduloso-puberulisque porrectis vel suberectis remotis rectis 4–5 mm. longis vel ad apicem exigue excurvatis vel incurvatis, exteriore facie 100–200 aculeis approximatis armato, aculeis anguste subulatis rectis vel superne curvatis glabriusculis vel basin versus glandulosis 2–3.5 mm. longis.—ILLINOIS: bottomlands of Illinois River near Peoria, Oct. 1, 1919, *Virginius H. Chase*, no. 3398, as *X. globosum* Shull (Herb. Chase., Herb. Gray.); Sept. 12, 1920, *Chase*, no. 3474, as *X. globosum* (Herb. Chase., Herb. Gray.); Sept. 15, 1945, *Chase*, no. 8205 (TYPE in Herb. Gray.; ISOTYPE in Herb. Chase.).

Although originally identified as *Xanthium globosum*, a natural identification since there was then no good material readily available of Shull's species, *X. Chasei*, named for its discoverer, VIRGINIUS HEBER CHASE, differs at once from that species (our PL. 1015, FIGS. 1 and 2) in several characters which appear in all the specimens before me. In *X. globosum* the leaves are thinnish to membranaceous and the ripe bur is light brown, with the body only 0.9–1.1 cm. long and 4.5–7 mm. thick, while the 50–80 prickles visible on one face are remote and 4–6 mm. long. This species is widespread from Illinois and Kentucky to Kansas and is represented in Mr. Chase's series by fine specimens from the bottomlands near East Peoria, his nos. 8206 and 8207. *X.*

Chasei differs in its thick and more scabrous foliage and especially in its burs. These are olivaceous or greenish brown, the body 1.3–1.6 cm. long and 6–9 mm. thick, with 100–200 prickles visible on one face, these rather crowded and only 2–3.5 mm. long. So far as the abundant material shows, the fruit of *X. Chasei* scarcely overlaps in any point the distinctive characters of *X. globosum*.

In its very short prickles *Xanthium Chasei* might suggest the European *X. strumarium* L. (our PL. 1013, FIGS. 2 and 3), a species with us only casually adventive[1] but apparently not naturalized near the port of Boston; but the two differ in many points and the natural habitat of *X. Chasei* is not ballast and rubbish about eastern seaports. In *X. strumarium* the petioles are minutely soft-pilose and the leaf-blades submembranaceous and barely scabridulous above; whereas the petioles of *X. Chasei* (on bottomlands where many plants tend toward glabrescence and thin leaves) are harshly scabrous, as is the upper surface of the thick leaf-blade. In *X. strumarium* the mature burs are closely and finely pilose, with the body only 5–7 mm. thick, the beaks only 1–2 mm. long, while the 15–50 slender prickles visible on each face have broad interspaces separating their bases. In *X. Chasei*, on the other hand, the mature burs are 6–9 mm. thick, glabrous (except for glandular punctation), the beaks 4–5 mm. long, the 100–200 bulbous-based prickles visible on one face crowded.

There is no chance that *Xanthium Chasei* has anything to do with the large-fruited series with strongly villous burs: *X. italicum* Moretti with fulvous burs villous-hirsute, the body 1.3–1.8 cm. long and 6–8 mm. thick, the subulate basally long-hirsute beaks 5–7 mm. long, the divergently long-villous prickles mostly 4–7 mm. long (see PL. 1015, FIGS. 3 and 4); *X. oviforme* Wallr. with

[1] In the Gray Herbarium there are 3 sheets of *Xanthium strumarium* from the United States: (1) a fragment of doubtful origin in a series of plants said to have been collected by the late Stephen P. Sharples in Chester County, Pennsylvania, from 1858–1864; (2) branches from a single tall plant, found by the writer on October 20, 1912 (with fresh anthers), in rubbish back of Crescent Beach, Revere, Massachusetts; (3) portion of a single individual found on October 1, 1927, by S. F. Blake (*Blake*, no. 10,549) on a sandy beach at Hull, Massachusetts. In early November, 1945, Dr. Bernice G. Schubert and I followed the beach from south of Crescent Beach to well north of that area but no *Xanthium strumarium* could be found. Similarly, the sandy and gravelly beaches in Hull, like those in Revere, yielded only *X. echinatum*, *italicum* and *chinense*.

the body of the fulvous bur 2–2.5 cm. long and 1.2–2 cm. thick, the stoutish beaks 7–10 mm. long, and the densely crowded prickles 7–10 mm. long; and other species. Nor can it be forced into the very definite *X. inflexum* Mackenzie & Bush (our pl. 1015, figs. 5 and 6), which occurs on bottomlands and prairie of Illinois, Missouri, Kansas and Arkansas, for *X. inflexum* has the glabrous to hirtellous body of the bur 1.3–2 cm. long and 6–8 mm. thick, the strongly inflexed to overlapping or crossing beaks 5–7 mm. long, and the prickles 4.5–10 mm. long.

The glabrous or glabrescent burs of *Xanthium Chasei* might, to some minds, mean that it is *X. chinense* Mill. or *X. curvescens* Millspaugh & Sherff. The widely dispersed *X. chinense* (our pl. 1015, figs. 7 and 8), however, has the fewer reddish-tinged prickles very remote at base and 4–7 mm. long, the more inflexed or hamate beaks up to 7 mm. long. As to *X. curvescens* (our pl. 1016, figs. 1–4), described from the shores of Lake Champlain, that doubtful species, illustrated with the original description in Field, Mus. Pub., Bot. Ser. iv., no. 2, pl. xi, the burs shown in pl. viii, figs. 28–29 (1919), has the body of the fruit only 3.5–5 mm. thick, with only 30–50 stout and upwardly curving prickles visible on each face. It thus has characters strongly suggestive of the Old World *X. orientale* L. (pl. 1017). In fact, very typical *X. orientale* (our pl. 1017, figs. 5–8) is an abundant weed about Montreal, thence up the Richelieu Valley to the shores of Lake Champlain (perhaps better stated in reverse order), and the most slender Old World fruits (our fig. 3) closely match those of *X. curvescens* (pl. 1016, figs. 1–4) and even of *X. leptocarpum* Millspaugh & Sherff. (our pl. 1016, figs. 5 and 6). In fact, when they published *X. curvescens* and *X. leptocarpum* the authors of those names saw their resemblance to *X. orientale*, saying

> Because of its strongly bent prickles and beaks, we were disposed at first to regard this species as a form of the European X. orientale L. But in the many fruiting specimens of X. orientale examined from Europe, we have found the fruiting involucres to be not only considerably larger, but brownish rather than reddish, also much more pubescent and the prickles nearly always more numerous. In its narrow, reddish, remotely aculeate fruits, this species suggests the next, X. leptocarpum, the type of which was collected likewise in western Vermont, about three years earlier. Indeed, as a species, it seems to lie just half-way between X. orientale and X. leptocarpum, and for a time we suspected it of being a hybrid between these two species. But the apparent absence of true X. orientale from all of North America would seem to make an assumption to this

effect purely gratuitous. Nor do we feel inclined to regard our plant as an anomalous race or variety of X. leptocarpum, since the arcuate character of its prickles is a character that holds with a high degree of uniformity throughout the specimens of the corresponding X. orientale of Europe.

Had they realized the establishment of *X. orientale* from the shores of Lake Champlain to the streets, waste lots and wharves of Montreal, their first impression might have prevailed. At any rate, *X. Chasei* has nothing to do with *X. orientale*, and the doubtfully separable *X. curvescens* and *X. leptocarpum*.

If only its short beaks and prickles were taken into account and all other characters ignored or overlooked (a tendency too apparent in some recent so-called studies of *Xanthium*), *Xanthium Chasei* might superficially be placed with *X. echinatum* Murr. and *X. varians* Greene, for in all three of these species the beaks are unusually short and stout and the prickles short. There, however, the resemblance ends. Both *X. echinatum* (our PL. 1018) and *X. varians* (PL. 1019) have the olive-shaped drab to pale brown mature bur densely long-hirsute, the stout beaks 3–6 mm. long and with very stout hispid bases 2–3 mm. thick, the remote prickles mostly hamate, hirsute-villous below the middle and 3.5–5 mm. long. By recent authors the inland *X. varians* has not been distinguished from the coastal *X. echinatum;* but the two are well distinguished both by characters of leaf and bur and by their strikingly different habitats, *X. echinatum* confined to sea-beaches, dune-hollows and borders of saline marshes along the coast from southern Maine to Virginia; *X. varians* occurring inland, on shores and damp prairie, from western Quebec to northern Alberta, south to northern New York (St. Lawrence drainage), Iowa, South Dakota, Saskatchewan and Oregon. In the halophytic *X. echinatum* the young stem is whitened above with harsh and short hispidity, the later full-grown leaves are broadly cordate or subcordate-ovate, unlobed or very shallowly lobed, with undulations mostly longer than deep (FIGS. 1 and 2), and the beaks of the fruit (FIGS. 3–6) tend soon to inflex and finally to become approximate or with their tips crossing, like the bill of a crossbill. The inland *X. varians* (PL. 1019), on the other hand, has the greener stem with sparse pubescence, the larger leaves more often rhombic or cuneate-based, their margins subacutely dentate with teeth nearly or quite as high as broad,

and the erect or nearly erect beaks straight or nearly so (figs. 2 and 3). Only by the most superficial treatment could *X. Chasei* be crowded into either of these apparently different species or geographic varieties for its bur is essentially glabrous and lustrous, olivaceous, and with crowded nearly glabrous prickles only 2–3.5 mm. long.[1]

I realize that in his somewhat novel (and we hope, immature) concept Cronquist, following the cue of Wiegand, who saw more hybrids than pure strains in several variable groups, has intimated in Rhodora, xlvii. 403 (1945) that most if not all our species of *Xanthium* are variations of one species, the European *X. strumarium*, for he finds that "The determination of species of *Xanthium* has become a formidable task, undertaken by many botanists only when it becomes unavoidable, and then with serious misgivings", exactly the situation with *Carex*, *Potamogeton*, *Festuca* and many other groups with inconspicuous flowers, which are regularly dodged by those who want to work only on pretty flowers. Nevertheless, there are scores of very real species in these genera and they have been clearly recognized by some of the most thorough and wise students of plants, for we bow with profound respect to such sound students of *Carex*, for example, as Willdenow, Schkuhr, Schweinitz, Torrey, Dewey, Francis Boott, William Boott, Tuckerman and many others, although the casual botanizer lets the genus alone. Similarly, that the study of *Xanthium* bristles with difficulties none will gainsay; but, paradoxically, the harder the points in this genus the easier

[1] It seems hardly necessary, in orienting *Xanthium Chasei*, to illustrate three species found in the eastern United States, with which it could not be confused. The bur of *X. pensylvanicum* Wallr. is very similar to that of *X. chinense* but, whereas the body of the latter is glabrous or merely glandular-punctate and lustrous, that of *X. pensylvanicum* is short-pilose with pale pubescence, and the 200 or more prickles visible on one face are mostly glandular-hispid below the middle, the bases of the prickles about as broad as the interspaces. In *X. chinense* the interspaces are broader than the nearly or quite smooth bases of the fewer prickles (100–150 visible on one face). *X. pensylvanicum* thus stands between *X. chinense* and *X. italicum*. *X. speciosum* Kearney has a bur (including beaks and prickles) 3–4 cm. long and 2–3 cm. thick, the almost filiform-setose prickles 7–9 mm. long and so crowded as to have their bases practically hidden, the beaks 6–11 mm. long. *X. Wootoni* Cockerell could be confused only with *X. orientale*, but it differs in its fewer heavily glandular and straightish prickles and in having the porrect (instead of strongly incurving) beaks more distant from the upper prickles. The burs of all four of the species are beautifully illustrated by Millspaugh & Sherff or by Widder.

the identifications, for, whereas young and relatively tender flowering plants and even those with well-grown but immature fruit are most difficult to distinguish (being annuals of very similar habit and foliage), the fully mature and very hard burs alone are sufficient for identification. The somewhat discouraged verdict of Wiegand, which Cronquist accepts in lieu of working out the characters, is not final: "It is probably wise to treat all North American Xanthiums as one species except *X. spinosum* L. and possibly *X. strumarium* L. and *X. echinatum* Murr. *X. strumarium*, however, is scarcely distinct, and with more study may also be included. *X. echinatum* may be a real species, as it has a distinct coastal range and seems to behave as though genetically distinct". Cronquist is "in complete agreement with Wiegand's observations, except that *X. strumarium* sens. strict., seems no more than varietally distinct from our plants, and that I am quite unable to see any sort of taxonomic unit in *X. echinatum*."

Inability to see what others clearly see is not a sin; neither does it necessarily clarify a question. To those who have some understanding of the characters in the genus, Wiegand's recognition of *X. echinatum* will appeal. Several close students have devoted themselves to the difficult and often thankless task of working out the characters of *Xanthium:* (1) Wallroth, *Monographischer Versuch über die Gewächs-Gattung Xanthium,* Wallr. Beitr. i. 219–244 (1844), Wallroth recognizing 21 species, 7 of them North American;[1] (2) Millspaugh & Sherff, *Revision of the North American Species of Xanthium,* Field Mus. Pub., Bot. Ser. iv. no. 2 (1918), with very fine illustrations of the burs, this very detailed study also recognizing 21 species but all of them found in North America, the authors having gone to great pains to identify the types of earlier-described species; (3) Widder, *Die Arten der Gattung Xanthium* in Fedde, Repert. Beih. xx. (1923), a very conservative and careful study with clear illustrations of the fruits, the original text completed before the publication of the monograph of Millspaugh & Sherff, but that study summarized in the Nachtrag. Widder maintained most of the species

[1] That Wallroth was not a visionary, as one might infer from those who can see nothing in his species of *Xanthium*, is apparent from his great monograph of *Agrimonia*, published also in his Beiträge, for his four new North American species, *A. gryposepala*, *rostellata*, *microcarpa* and *pubescens*, are all maintained by those who have closely studied the genus.

recognized by Wallroth and by Millspaugh & Sherff. If, as we have recently been told, all of them, except *X. spinosum*, are modifications of a single species, which in its typical form has scarcely gained a foothold (and that near a large Atlantic port) in America, it is amazing that not one of the really careful students of the genus should have suspected the species to be of such instability.

Besides the three great monographs of *Xanthium*, there have been many significant but briefer studies, these noted by Millspaugh & Sherff and by Widder. From our viewpoint as significant as any is that of the physiologist, Professor Charles A. Shull, *Physiological Isolation of Types in the Genus Xanthium*, in Bot. Gaz. lix.[1] 474–483, with 7 blocks of figs. (1915). Desiring material for physiological study, Shull went to an old field near Lawrence, Kansas, where plants of *Xanthium* with 3 quite different types of bur abounded. "It was thought that the various forms were possibly the result of promiscuous crossing of varieties or elementary species, and that a year or two of guarded pollination would be necessary to purify the strains." Shull took essentially uniform burs from a single plant each of the three extremes, what he eventually described as a true species, his *X. globosum*, the wide-ranging *X. pensylvanicum* and *X. canadense* (now known by the earlier name *X. chinense*). Successive generations from these fruits in carefully checked plots proceeded to come true and not to show any Mendelian segregation. "This result was wholly unexpected, as it was believed that hybridization could hardly have been avoided in nature". Shull recognized not only the differences in burs but those of cotyledons even, as well as of pigmentation of the stems and prickles and shape of the seeds and color of their coats; and, having started out a skeptic, with the popular preconception that the differences of burs and other characters he saw were the result of "promiscuous crossing", he frankly concluded his experimental study by defining a new species, and on his last page he unblushingly predicted that "There are probably a number of new species of *Xanthium* still undescribed in America". *X. Chasei* is one of them.

[1] Through the perverse fatality which dogs editorial movements the signature of the Gazette on which Shull's paper begins bears the note "**Botanical Gazette, vol. 69**]"

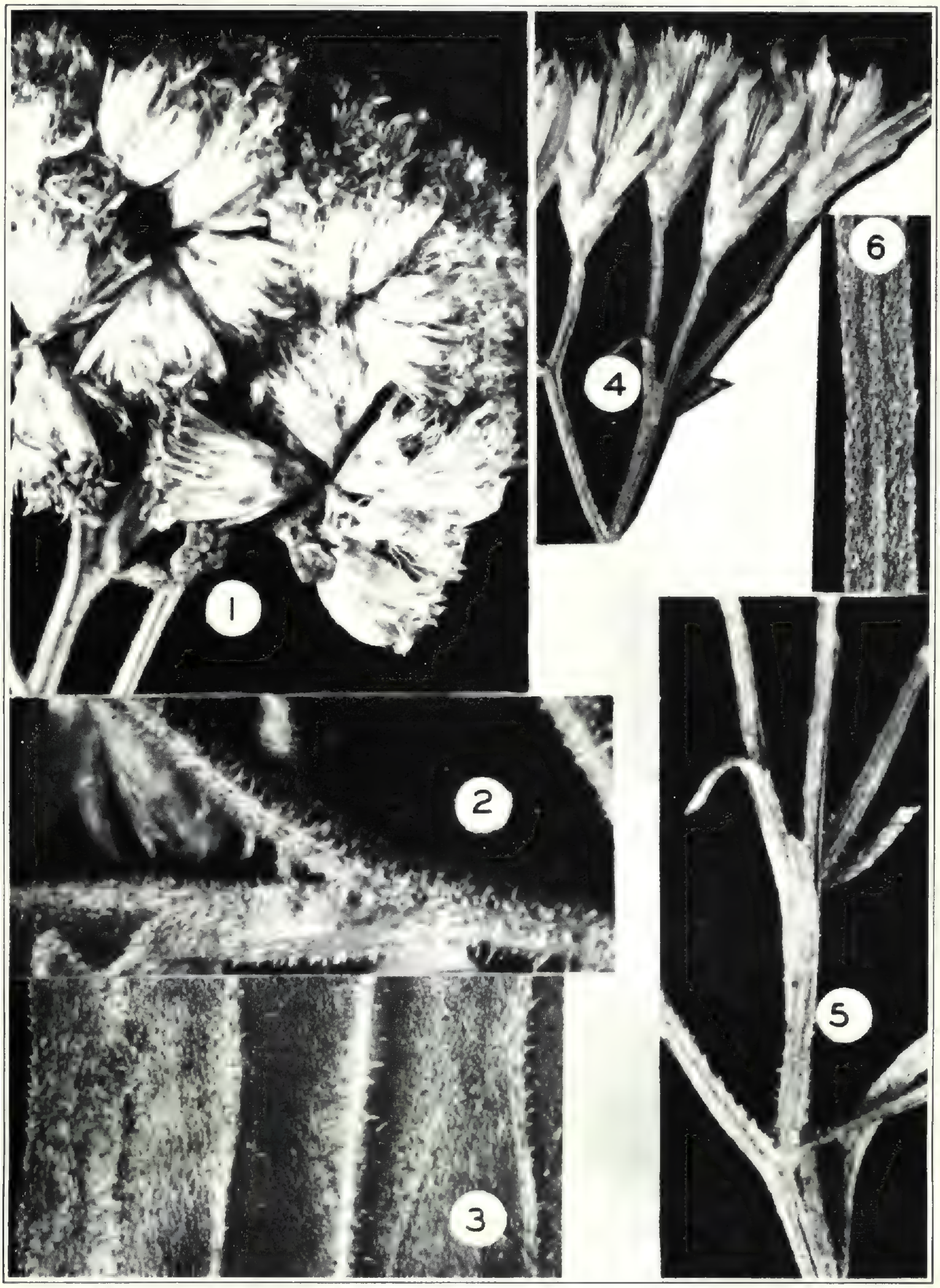


Photo B. G. Schubert

SOLIDAGO GRAMINIFOLIA, var. NUTTALLII: FIG. 1, glomerules, × 5; FIG. 2, branchlet and pedicel, × 10; FIG. 3, lower surface of leaf, × 10.
S. MICROCEPHALA from TYPE-REGION: FIG. 4, pedicelled heads, × 5; FIG. 5, branchlet and pedicels, × 10; FIG. 6, upper surface of leaf, × 10.

Photo B. G. Schubert

XANTHIUM CHASEI: FIG. 1, TYPE, × 3/7.
X. STRUMARIUM: FIG. 2, bur, × 2; FIG. 3, bur, × 5.

On the Illinois bottomlands near Peoria *Xanthium Chasei* has remained constant, just as *X. echinatum* does along the coastal sands or as does the distinctive *X. speciosum* Kearney, brought unintentionally in western fleeces to New England woolen-mills, whence it has washed down-river and made constant and consistent colonies far from their native haunts.

Cronquist's last paragraph on *Xanthium* reads:

> Although both species [all-inclusive *X. strumarium*, involving all American members of DeCandolle's § *Euxanthium*, and *X. spinosum*, the single species recognized by him in § *Acanthoxanthium* DC.] of *Xanthium* have now become cosmopolitan weeds, and *X. strumarium* was well established in Europe four hundred years ago . . . , it seems probable that they originated in the new world. Except for a few species of *Ambrosia*, the subtribe *Ambrosinae* is otherwise exclusively American.

That statement implies that the several endemics in *Xanthium* § *Euxanthium* which are known only in the Old World, such unique plants as *X. inaequilaterum* of DeCandolle (who was no "splitter"), found from Java and Borneo to Japan and the coast of southeastern China, or as *X. indicum* Konig (*X. Roxburghii* Wallr.) of tropical and subtropical India, Sumatra and Java,—the implication is that such endemic species of the Old World originated in America, but entirely quit the New World in favor of the Old. This interpretation is again illustrated by *X. spinosum*, often assumed to be indigenous (as perhaps it is) in South America, but certainly not in eastern North America, where it is a weed of relatively recent introduction. Linnaeus described it "*Habitat in* Lusitania" and Widder, whose citations of South American and North American specimens occupy less than 1 page, gives up 6 pages to citations of European and African specimens. Whether this semicosmopolitan weed is native in South America I cannot say, but the learned Charles Pickering wrote in his Chronological History of Plants, 976 (1879): "Transported to North America as late perhaps as 1814 (as may be inferred from the silence of Walter, Michaux, and Pursh), was found by Nuttall in 1818 near dwellings from Savannah to Washington, and not foreseeing that it would become troublesome, was introduced by him as he informed me into the environs of Philadelphia; . . . In the Southern Hemisphere, by European colonists also, was probably carried across the Andes into Chili (Beechey voy. 57, and A. Dec.)", Hooker & Arnott,

in their Botany of Captain Beechy's Voyage, recording it from Valparaiso, surely not an undisturbed locality. Finally, in regard to the nativity of *X. spinosum*, the article, *Xanthium spinosum in Neolithic deposits in Bulgaria*, by W. B. Turrill in Kew Bull. for 1923: 190 (1923) is significant:

> *Xanthium spinosum* is one of the commonest ruderal plants of Central Europe and the Mediterranean region. It has generally been considered by recent writers to be a native of South America. The strong arguments in favour of this view will be found summarized by Thellung in his Flore adventice de Montpellier . . . . Another opinion, which was current among earlier botanists, that *Xanthium spinosum* was native in South Russia, was rejected by Ascherson . . . . It may also be noted that according to L. Simonkai and Karl Flatt . . . both A. Florentin and also C. Spegazzini have collected fossil fruits ('false-fruits') of *X. spinosum* from the Pliocene beds in the Tertiary formation of the Pampas.
>
> "During a visit to Bulgaria last summer Dr. N. Stoianoff of Sofia University gave me some semi-fossilized fruits which careful comparison at Kew has shown to be those of *Xanthium spinosum*. These were obtained during excavations in prehistoric deposits . . . east of Sofia, . . . The deposits are of Neolithic age . . .
>
> "Whatever may be the real history of *Xanthium spinosum* in the Old World this discovery would seem to indicate that the species existed in South Europe long before the dates (1700–1750) accepted by Thellung for its first introduction and establishment.

Surely Neolithic Bulgarians did not come to America to get it. *Xanthium*, like *Ambrosia*, obviously has species native to the Old World as well as to the New. Wallroth thought that he saw characters to separate American material from typical European *X. spinosum*. And, although Cronquist would reduce all *Xanthium* to the two species (*i. e.* the two sections of DeCandolle and others), the European *X. strumarium* L. and *X. spinosum* L., it is most difficult to believe that the very distinct and characteristic *X. ambrosioides* Hooker & Arnott, the Argentinian procumbent plant with bipinnate blunt-lobed leaves, a species which has to be taken into account by those who watch the waste lots of New England, can possibly be forced into *X. spinosum*. Hooker & Arnott were ultraconservative, yet they saw what is a really good species in *X. ambrosioides;* so did Widder; so do others.

Helianthus atrorubens L., var. **alsodes,** var. nov. (tab. 1020), foliis imis longe petiolatis anguste ovatis vel late lanceolatis acutis vel subacutis plerumque serratis vel serrato-dentatis; foliis supernis anguste ovatis vel lanceolatis.—Dry open woods, thickets and clearings, Virginia, North Carolina and upland of southeastern Kentucky and eastern Tennessee. Virginia: dry

land about 3 miles north of Williamsburg, James City Co., *R. W. Menzel*, no. 289; dry open thickets, Virginia Beach, Princess Anne Co., Sept. 10, 1935, *Fernald, Long & Fogg*, no. 5127 (TYPE in Herb. Gray.; ISOTYPE in Herb. Phil. Acad.); rich woods and bushy clearing north of Double Bridge, southwest of Jarratt, Sussex Co., *Fernald & Long*, no. 11,474; Bedford Co., Oct. 15, 1871, "leafy-stemmed form", *A. H. Curtiss;* "Mts., Carol. & Virginia", *Asa Gray*. NORTH CAROLINA: sand-ridge at Atlantic, Cartaret Co., *Godfrey*, no. 6447; pineland near Goldsboro, Wayne Co., *Godfrey*, no. 6576; sand-ridge near Roseboro, Sampson Co., *Godfrey*, no. 5699; sand-ridge at Carolina Beach, New Hanover Co., *Godfrey*, no. 6368; pine woodland, Raleigh, *Godfrey*, no. 6601; thicket, Raleigh, *Godfrey*, no. 6892; dry thicket, north of Spruce Pine, Mitchell Co., *Wiegand & Manning*, no. 3378; dry open woods, Biltmore, Buncombe Co., *Bilt. Herb.*, no. 499[a]; rich wooded mountain side near Asheville, *A. H. Curtiss*, no. 6526; open woods, Henderson Co., Aug. 24, 1881, *J. D. Smith* (as *Rudbeckia fulgida*); open woodlands, Highlands, *Bilt. Herb.*, no. 499[c]. KENTUCKY: roadsides and fields east of Cumberland Falls, Whitley Co., *McFarland*, no. 59. TENNESSEE: gravelly oak-pine woods, Jamestown, Fentress Co., *Svenson*, no. 4100.

Helianthus atrorubens consists of the two rather marked varieties: var. *normalis* Kuntze, Rev. Gen. i. 343 (1891), and the narrower-leaved plant here described as var. *alsodes*. The species started with the detailed description and life-size plate of *Corona solis minor, disco atro-rubente* of Dillenius, Hort. Elth. 111, t. xciv (1732) and the *Helianthus foliis ovatis crenatis* of Gronovius, both cited without further description by Linnaeus, who obviously took his epithet from Dillenius (whose plant was from Carolina) but gave the "Habitat in Virginia". There was no specimen of the species in the Linnean Herbarium at the time of writing *Species Plantarum;* and the Gronovian description of the Clayton specimen, with "folia asperata paucis auritis, ex adverso binis auriculatis", suggests the Dillenian plate, in which there are tiny leaves ("auricles") at the bases of some large primary leaves. Such tiny undeveloped axillary branchlets occasionally occur in the plant with ovate or oval bluntish leaves (var. *normalis*) but I have not seen them in var. *alsodes*. The Dillenian plate (which may stand as TYPE of the species) is of the characteristic plant found from Florida to Louisiana, north to Virginia and Tennessee, with the basal leaves ovate or oval and crenate to dentate, these and the lower cauline with blades one half to four

fifths as broad as long and blunt or merely subacute, their bases abruptly contracted to the winged petiole, the sessile or subsessile median cauline leaves ovate or oval. In this plant the middle phyllaries are broadly rounded at summit or abruptly short-acuminate.[1] Var. *alsodes*, although found in the northeastern third of the specific range, has the lower long-petioled leaves usually more gradually tapering from petiole to blade, and the most often serrate or serrate-dentate blade is acute or acutish, two to five times as long as broad; the lowest sessile cauline blades lanceolate or narrowly ovate. In var. *alsodes* the middle phyllaries (fig. 3) are usually less broadly rounded at summit.

It is barely possible that *Helianthus atrorubens*, var. *alsodes* is the plant described as *H. sparsifolius* Ell. Sk. ii. 415 (1823) from the "western districts of Georgia", as contrasted with his *H. atrorubens* apparently common in his own region of southeastern South Carolina. Elliott's "leaves ovate, acute, coarsely toothed" is good, but "abruptly contracted into a petiole" not so good; furthermore, since he defined *H. atrorubens* as having "leaves spathulate", it would be unwise, his specimens of *H. sparsifolius* not being preserved at Charleston, to take up the name for var. *alsodes*. From the citation by E. E. Watson in Papers Mich. Acad. ix. 343 (1920), in the synonymy of *H. atrorubens*, of *H. gracilis* Bertoloni one might infer that Bertoloni had our plant. It is noteworthy, however, that Watson omitted the citation of Bertoloni's plate, which he evidently had not seen. *H. gracilis* Bertoloni, Misc. Bot. vii. 41, t. vi, fig. 1 (1868), shown life-size, is a monocephalous plant with lower entire leaves barely petioled, extending gradually as linear-lanceolate blades to the single peduncular summit of the stem, the phyllaries linear or lanceolate

[1] The following are characteristic specimens of var. NORMALIS. VIRGINIA: west of Mt. Hope Church, Southampton Co., *Fernald & Long*, no. 11,472; northwest of Round Gut, southwest of Franklin, Southampton Co., *F. & L.*, no. 11,473. NORTH CAROLINA: west of Jacksonville, Onslow Co., *Godfrey*, no. 6461; Winston-Salem, Forsyth Co., *Godfrey*, no. 6103; Biltmore, Buncombe Co., *Bilt. Herb.*, no. 499[a]; South of Tuxedo, Henderson Co., *Wiegand & Manning*, no. 3377; Highlands, Aug. 2, 1902, *Magee;* Joy, Burke Co., *Hunnewell*, no. 12,981. SOUTH CAROLINA: Eutawville, *Eggleston*, no. 4997; Marietta, Greenville Co., *Wiegand & Manning*, no. 3376. GEORGIA: Middle Ga., 1846, *Porter*. TENNESSEE: Chilhowee Mt., *A. H. Curtiss*, no. 1439. LOUISIANA: without stated locality, *Drummond*.

It is not improbable that var. *normalis* tends to grow in damper soil than var. *alsodes*. Of the 16 sheets before me of var. *alsodes*, of which *habitat* is given, all are from dry situations. Of the 13 of var. *normalis* with habitat noted 2 are from savannas, 1 from pine-barren bog.

Photo B. G. Schubert

XANTHIUM CHASEI, FIGS. 1, 2 and 3 from TYPE: FIG. 1, portion of plant, × 1; FIG. 2, bur, × 2; FIG. 3, portion of bur to show beaks and bulbous-based prickles, × 5; FIG. 4, bur, × 2, and FIG. 5, its summit, × 5.

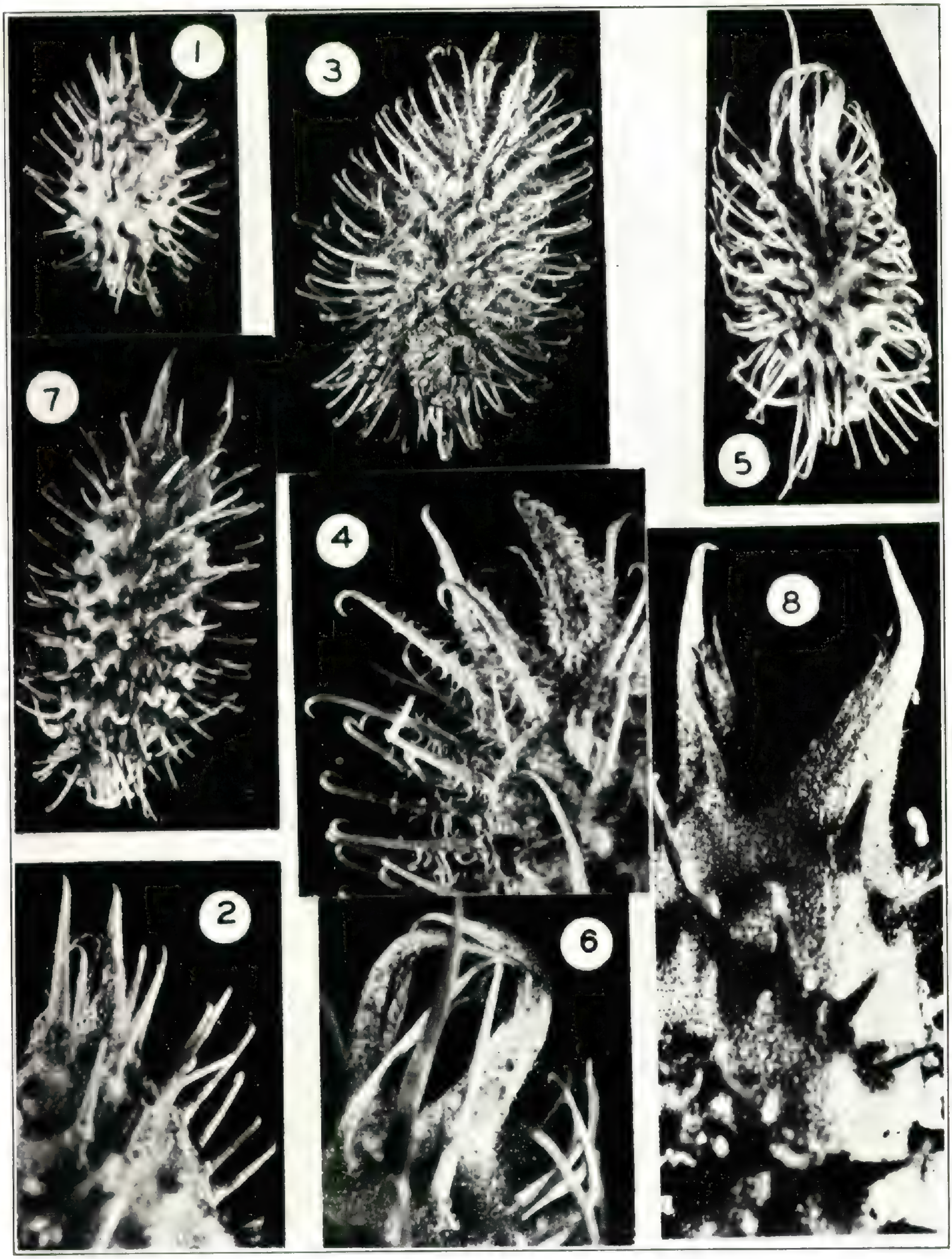
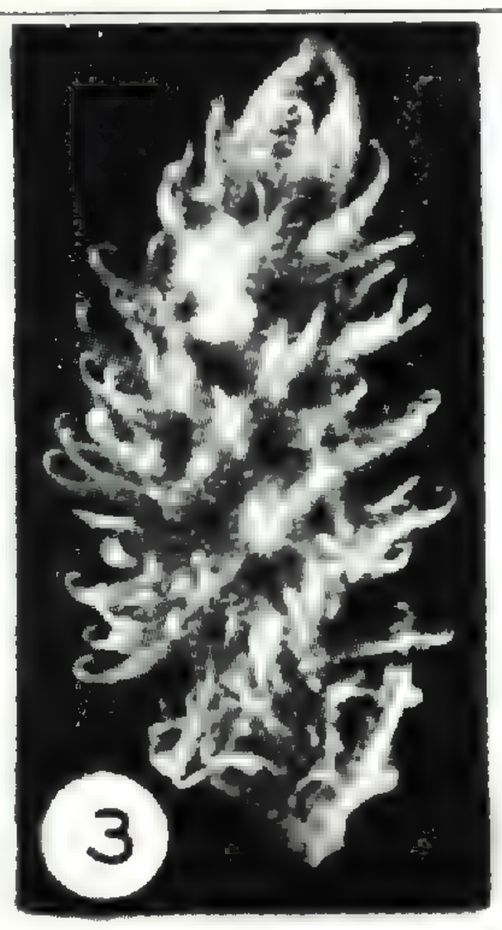
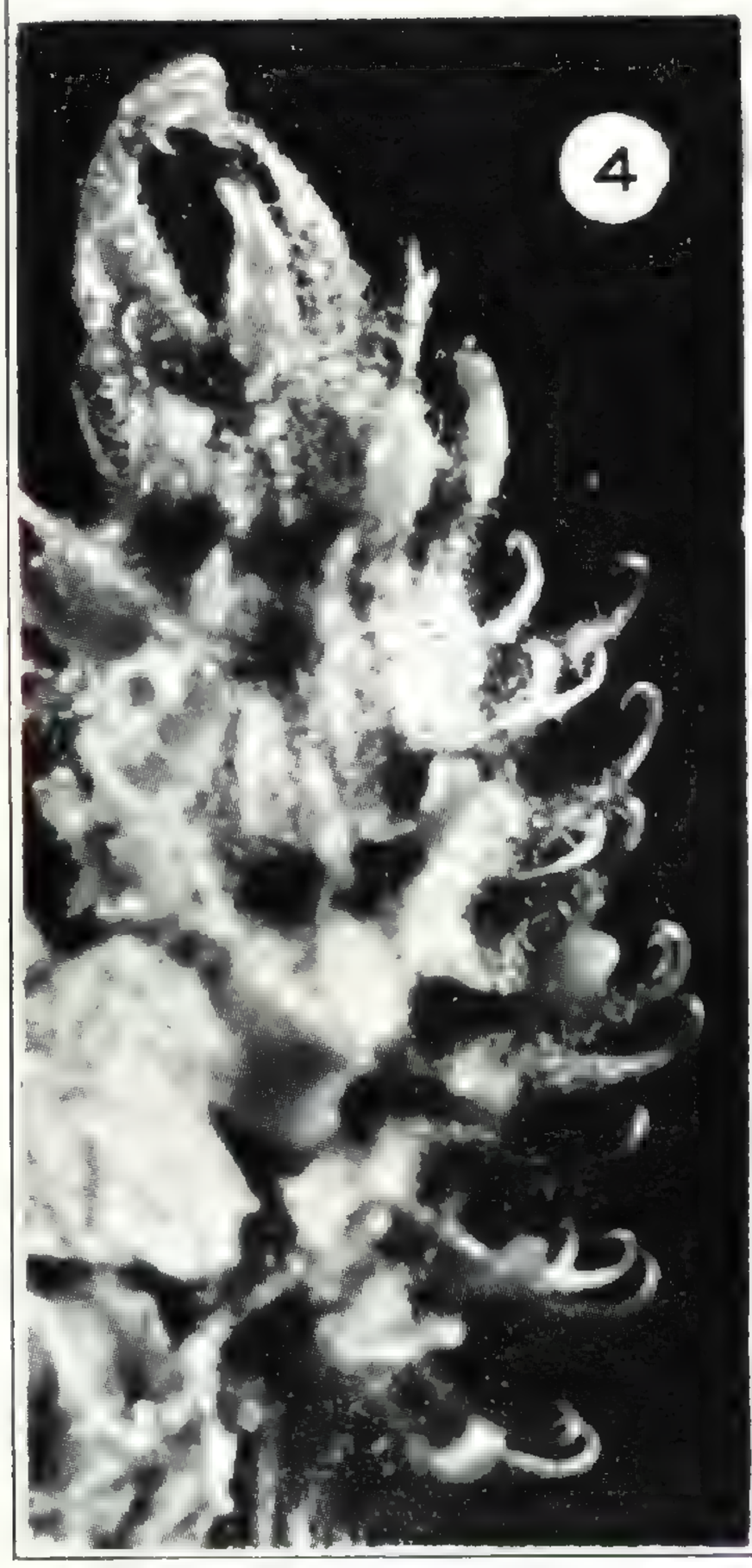


Photo B. G. Schubert

XANTHIUM, BURS, × 2, BEAKS, × 5; FIGS. 1 and 2, X. GLOBOSUM, from plant raised from seed of TYPE; FIGS. 3 and 4, X. ITALICUM; FIGS. 5 and 6, X. INFLEXUM; FIGS. 7 and 8, X. CHINENSE.





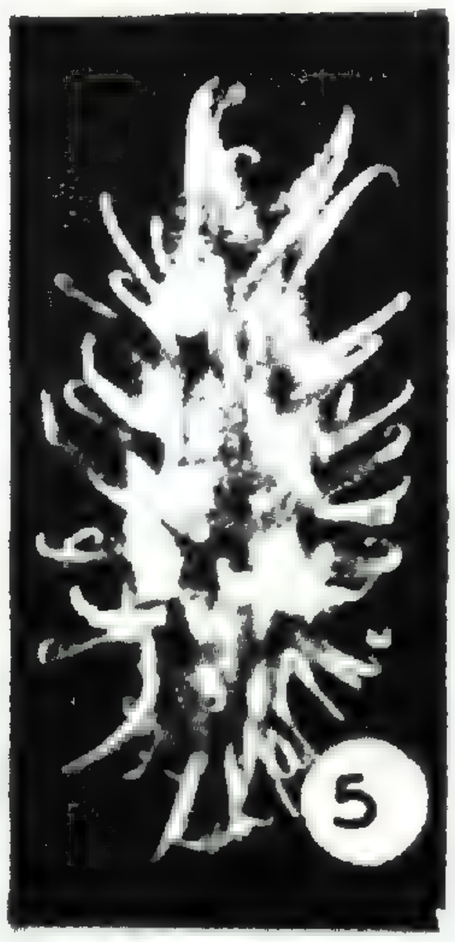


Photo B. G. Schubert

XANTHIUM, entire burs × 2, enlargements × 5: FIGS. 1–4, X. CURVESCENS, FIGS. 1 and 2 from TYPE; FIGS. 5 and 6 from TYPE of X. LEPTOCARPUM.

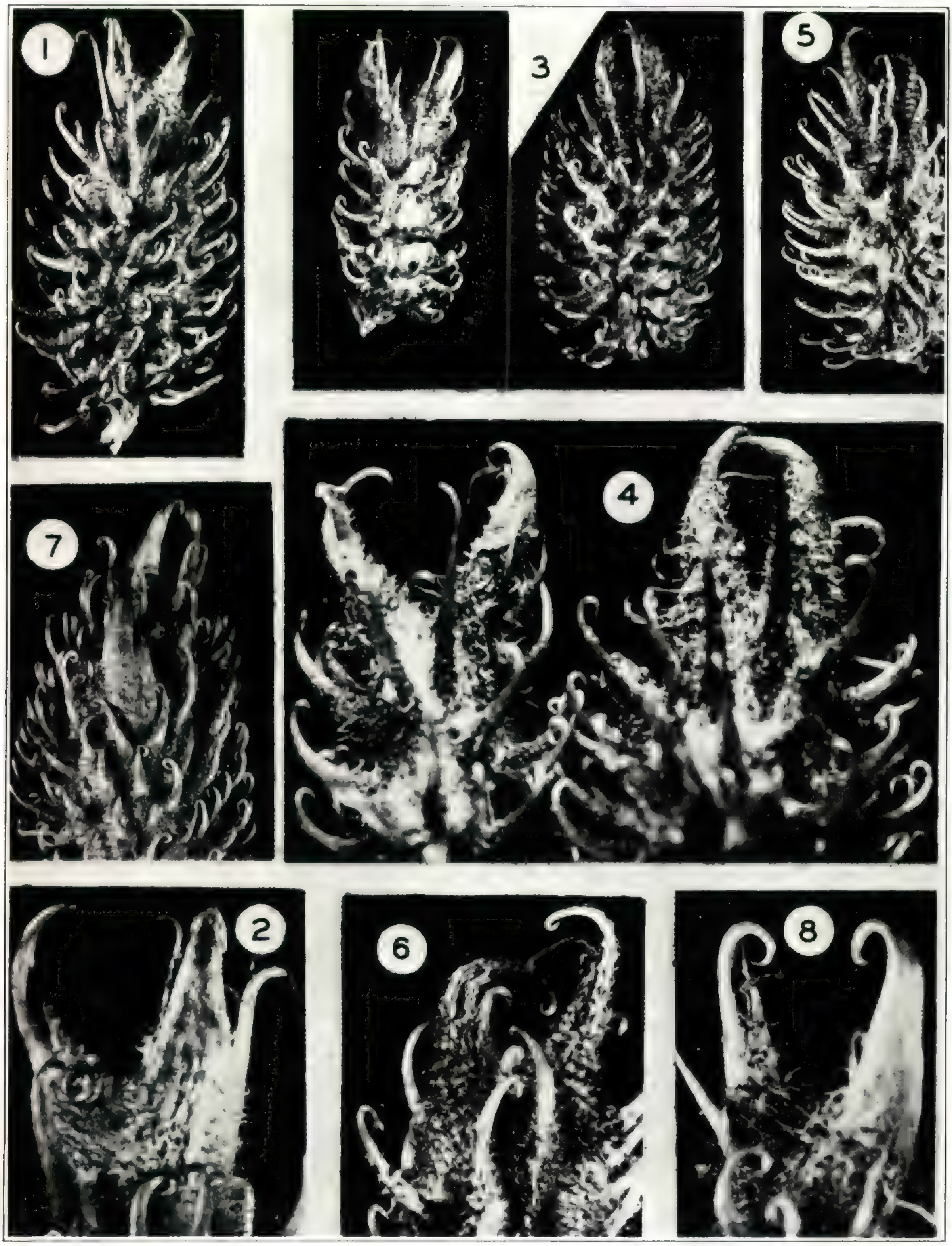


Photo B. G. Schubert

XANTHIUM ORIENTALE: FIGS. 1, 3, 5 and 7 burs, × 2; FIGS. 2, 4, 6 and 8 beaks, × 5; FIGS. 1–4 from European plants, FIGS. 5–8 from plants adventive in America.

("squamis linearibus", also "lanceolatis"). It surely has nothing to do with *H. atrorubens*. In fact Bertoloni knew that, specially saying "Ab *Heliantho atrorubente* L. diversus". His plate suggests *H. heterophyllus* Nutt.

Another and really quite different species, *Helianthus silphioides*, is included by Watson under his aggregate *H. atrorubens*, a somewhat unexpected attitude, in view of the many minor variants in other series recognized by him as "new species", minor variants which forced the obliging but always cautious Dr. C. C. Deam to write in his *Flora of Indiana*, "I at first attempted to construct a key to our species using Watson's determinations", and to state in conclusion: "I have excluded 15 species that have been reported for the state". Surely *H. silphioides* Nutt. in Trans. Am. Phil. Soc. vii. 366 (1841), found from "the plains of Arkansa" and southeastern Missouri up the Mississippi drainage to southwestern Indiana, thence south to Alabama and Louisiana, later described from along the Mississippi in Kentucky as *H. kentuckiensis* McFarland & Anderson in Am. Mid. Nat. ix. 139, t. 10, (1924),—surely this very distinct plant cannot be satisfactorily referred to the more eastern *H. atrorubens*, as is done by Watson. In fact, Nuttall specially noted after the detailed description of *H. silphioides*, "Allied to *H. atrorubens* but" etc., just as Bertoloni had done after his description of the equally distinct *H. gracilis*. It almost appears as if both mentions of *H. atrorubens* had been mistaken as identifications with it.

To be sure, Dr. W. A. Anderson, coauthor of *H. kentuckiensis*, subsequently pointed out[1] that *H. kentuckiensis* is certainly identical with *H. silphioides* Nutt., as well as with the type of *H. atrorubens*, var. *pubescens* Kuntze, l. c. At that time Anderson considered the tall and very leafy plant, with slenderly short-petioled cuneate- or truncate- to cordate-based leaves running high and nearly uniformly up the stem, the pubescence of stem and roundish leaves short and close, as a Mississippi Valley extreme of *H. atrorubens* of "the Atlantic coastal plain, and . . . the mountains of North Carolina, Tennessee and Georgia", the latter with the stem hispid to villous below (our FIG. 2), the leaves "*ovate to oblong-lanceolate, . . . tapering or abruptly contracted into a winged petiole*", the "lower surfaces of the leaves

[1] W. A. Anderson in RHODORA, XXXIV. 1–4 (1932).

smoothish, with long hairs on veins and petiole". Anderson further noted that "Before publishing *Helianthus kentuckiensis* as a new species, Dr. McFarland and the writer sent a specimen to Mr. E. E. Watson who was then preparing a monograph of the genus. It was at his suggestion that the plant was described as a new species. Later, when his monograph appeared, Watson disposed of *H. kentuckiensis* as 'not a *Helianthus*'."

The photograph of the type of *Helianthus silphioides*, taken by Dr. S. F. Blake at the British Museum, and the original plate of *H. kentuckiensis* might have come from the same material, and, after studying the type of Otto Kuntze's *H. atrorubens*, var. *pubescens* (the "varietal name . . . not a happy one") from Cairo, Illinois, Anderson found it quite like the others. Dr. Anderson sent a root from the type-colony of *H. kentuckiensis* to the Harvard Botanic Garden, the crown then carrying a number of stems. That original plant, increasing by many deep-seated subterranean stoloniform roots and, as Mr. Francis Lazenby, the Superintendent, informs me, not here coming from the regularly scattered achenes, is now a clone or colonial plant of about 50 tall uniformly leafy fertile stems. Such a root-system, with the many elongate and stoloniform deep roots ending in vegetative buds and completely covering an herbarium-sheet is wonderfully displayed by a plant, mounted on three sheets, sent to the Gray Herbarium by Mr. *Ralph M. Kriebel* from a colony covering about 100 yards in Lawrence County, Indiana (*Kriebel*, no. 3965), tentatively placed with *H. scaberrimus*. Although the Kriebel plant has the leaves less rounded at base than in most typical *H. silphioides*, it is well matched by the foliage of the upper half of the stem of *Demaree*, no. 16,543 from Arkansas, as well as that of Buckley's material from Alabama. Its involucres, flowers and achenes are those of *H. silphioides*. How unlike the habit of *H. atrorubens!* The latter, with which I have become very familiar in the field, has a simple, short, horizontal or ascending premorse rhizome which rarely attains a length of 4 cm. It does not form clones, but the plants regularly have a single flowering stem, arising from the axil just beyond the remnants of the stem of the preceding year. Most of its leaves are borne from near the base of the tall stem, these on very long upwardly winged petioles. Far separated from these subbasal leaves there

is usually a pair of smaller but petioled leaves, borne one sixth to one fourth the way up the stem; then far above them a few much smaller and eventually merely bracteiform leaves up the almost scapose upper two thirds of the stem. With such differences of subterranean habit, pubescence, shape and distribution of leaves and geographic isolation, *H. silphioides* and *H. atrorubens* seem to me as distinct as any two species of *Helianthus*.

HELIANTHUS LAETIFLORUS Pers., var. **rigidus** (Cass.), stat. nov. *Harpalium rigidum* Cass. Dict. Sci. Nat. xx. 200 (1814). *Helianthus scaberrimus* Ell. Sk. ii. 423 (1823). *Helianthus rigidus* (Cass.) Desf. Cat. Hort. Par. ed. 3: 184 (1829). *Hel. rigidus*, forma *flavus* Deam, Fl. Ind. 975 (1940).

H. LAETIFLORUS, var. **subrhomboideus** (Rydb.), comb. nov. *H. subrhomboideus* Rydb. in Mem. N. Y. Bot. Gard. i. 419 (1900). *H. scaberrimus*, var. *subrhomboideus* (Rydb.) Farwell in Am. Midl. Nat. viii. 278 (1923).

When Deam defined *Helianthus rigidus*, forma *flavus* he "started something". Up to that time the very obvious division of *Helianthus* into a series with lobes of the disk-corollas purple, as opposed to those with corolla-lobes yellow, had been almost unchallenged, although it was well known that the commonly cultivated *H. annuus* may have "sports" with yellow, instead of the more frequent dark purple disk. As early as 1789 Lamarck, in his Dict. iii. 86, got confused and described as the quite different *H. atrorubens* L., a species then cultivated in the Jardin du Roi in Paris, a very scabrous plant with spatulate-oval harshly scabrous acuminate and triple-nerved leaves which tapered to short petioles; heads very showy, resembling those of *Rudbeckia* "mais qui sont plus grandes & ont plus d'éclat", these on long scabrous peduncles; the phyllaries erect and lanceolate; the disk "d'un jaune foncé". So obviously not the Linnean *H. atrorubens*, the plant of Lamarck was redefined by Persoon as *H. laetiflorus* Pers. Synop. ii. 476 (1807). *H. laetiflorus*, passed on to other large European gardens, was several times well illustrated and is well known as a native or as a garden-escape through much of eastern North America. When he discussed it in the Synoptical Flora Asa Gray, still clinging to the primary divisions, "Disk . . . dark purple or brownish" as opposed to "Disk yellow", placed *H. laetiflorus* immediately after *H. rigidus* but as the first species with "Disk yellow", and defined it "Re-

sembling tall forms of the preceding, similarly scabrous or hispid", etc., the plant recognized from "Indiana, Illinois, Wisconsin". When Deam said, under "Excluded Species", of *H. laetiflorus* "I am excluding the species from our flora and referring specimens so named to the yellow flowered form of *Helianthus rigidus* (Cass.) Desf.", he was right as to the identity but, unfortunately, he overlooked the fact that the specific epithet *laetiflorus* started in 1807, while *H. rigidus* was based on a name which was first published in 1814.

I am treating *Helianthus rigidus* as a variety rather than a color-form. In general it has thicker leaves than typical *H. laetiflorus* and its natural range is more western. Similarly, although Deam and, before him, E. E. Watson, got nothing out of *H. subrhomboideus*, which admittedly passes into western phases of *H. laetiflorus*, var. *rigidus*, it stands apart on several characters.

Var. *rigidus* has a very scabrous stem 0.7–2.5 dm. high; var. *subrhomboideus* a slender and less scabrous (especially above) stem 0.15–1.2 m. high. Var. *rigidus* has 7–15 leafy nodes, the lance-oblong to lance-ovate leaves acuminate to long tips, the longer blades up to 3 dm. long; but var. *subrhomboideus* has only 6–9 nodes, the leaves subrhombic and barely acute to bluntish, the larger ones only 0.5–1.5 dm. long. In var. *rigidus* the phyllaries are lanceolate to narrowly ovate; in var. *subrhomboideus* more oblong or oblong-oval. Although westward it merges into typical var. *rigidus*, it has come east to Quebec and New England, chiefly via transcontinental railways, from plains of the West. Here it is very pure and shows little or none of the transition to var. *rigidus* which occurs farther west.

Explanations of Plates 1007–1020

Plate 1007, Xyris Bayardi Fernald, all figs., from type: fig. 1, four plants, × 1; fig. 2, two spikes, × 5; fig. 3, tip of basal leaf, × 10; figs. 4 and 5, lateral sepals, × 10; fig. 6, seeds, × 10.

Plate 1008, X. brevifolia Michaux and X. flabelliformis Chapman. Figs. 1–4, X. brevifolia: fig. 1, bases of plants, × 1, from the general type-region, between Guyton and Ogeechee Rivers, Effingham Co., Georgia, *Harper*, no. 920; fig. 2, basal leaf, × 10, from no. 920; fig. 3, group of spikes, × 1, from the type of Michaux, after photo. by *Cintract;* fig. 4, spike, × 5, from no. 920. Figs. 5–7, X. flabelliformis, all figs. from isotype: fig. 5, base of plant, × 1; fig. 6, tip of basal leaf, × 10; fig. 7, spike, × 5.

Plate 1009, fig. 1, Pedicularis canadensis L.: characteristic plant, × ⅔, from Brooklin, Maine, *A. F. Hill*, no. 1419. Figs. 2 and 3, var. Dobbsii Fernald: fig. 2, characteristic base of plant, × ¾, from Spring Grove, Minnesota, *Rosendahl*, no. 276; fig. 3, flowering raceme, × 1, from no. 276.

Plate 1010, P. canadensis, var. Dobbsii, both from type: fig. 1, base of plant, × ⅔; fig. 2, fruiting raceme, × 1.

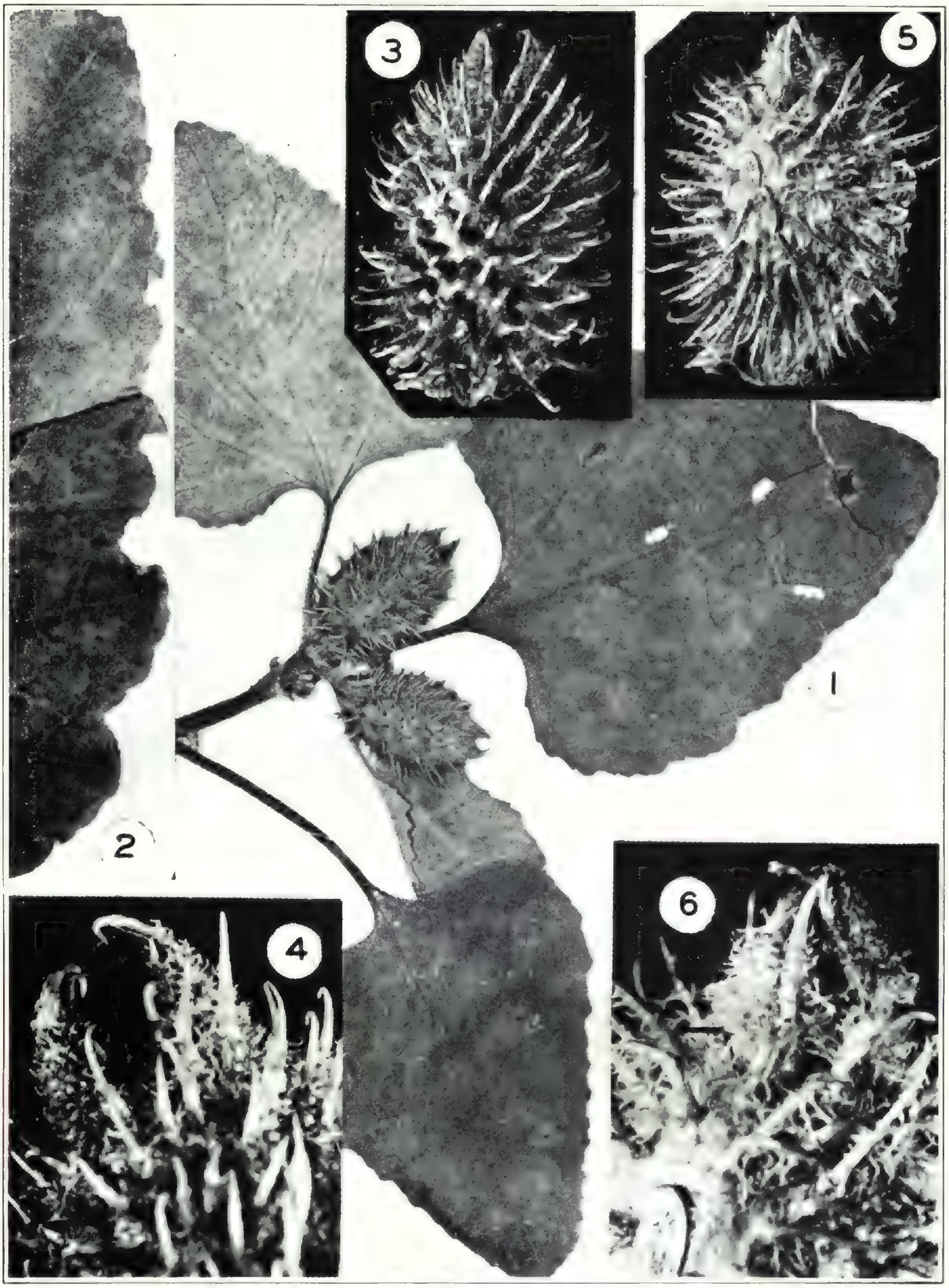


Photo B. G. Schubert

XANTHIUM ECHINATUM: FIG. 1, fruiting branch, × 1; FIG. 2, margin of large leaf, × 1; FIGS. 3 and 5, burs, × 2; FIGS. 4 and 6, beaks, × 5.

Photo B. G. Schubert

XANTHIUM VARIANS: FIG. 1, portion of ISOTYPE, × 1; FIG. 2, bur, × 2; FIG. 3, summit of bur to show beaks, × 5.

Photo B. G. Schubert

HELIANTHUS ATRORUBENS, var. ALSODES, all figs. from TYPE: FIG. 1, plant, × 3/8; FIG. 2, pubescence of base and petioles, × 2; FIG. 3, involucre, × 2.

PLATE 1011, × SOLIDAGO HIRTIPES Fernald, all figs. from TYPE: FIG. 1, portion of plant, × ⅓; FIG. 2, pedicelled heads, × 5; FIG. 3, pedicels, × 10; FIG. 4, upper, and FIG. 5, lower surface of leaf, × 10.

PLATE 1012, S. GRAMINIFOLIA (L.) Salisb., var. NUTTALLII (Greene) Fernald and S. MICROCEPHALA (Greene) Bush. FIGS. 1–3, S. GRAMINIFOLIA, var. NUTTALLII, all from near Alexandria, Virginia, *Blake*, no. 8697: FIG. 1, glomerules, × 5; FIG. 2, branchlet and pedicel, × 10; FIG. 3, lower surface of leaf, × 10. FIGS. 4, 5 and 6, S. MICROCEPHALA, all from the type-region, Sumter Co., Georgia, *Harper*, no. 636: FIG. 4, pedicelled heads, × 5; FIG. 5, branchlet and pedicels, × 10; FIG. 6, upper surface of leaf, × 10.

PLATE 1013, XANTHIUM CHASEI Fernald and X. STRUMARIUM L. FIG. 1, X. CHASEI, TYPE, × 3/7. FIGS. 2 and 3, X. STRUMARIUM: FIG. 2, bur, × 2, from Bavaria, *Killermann*, in Herb. Exsic. Bavar., no. 1226; FIG. 3, same bur, × 5.

PLATE 1014, X. CHASEI Fernald: FIG. 1, portion of TYPE, × 1; FIG. 2, bur, × 2, from TYPE; FIG. 3, portion of bur, to show beaks and bulbous-based prickles, × 5, from TYPE; FIG. 4, bur, × 2, from *V. H. Chase*, no. 3474; FIG. 5, summit of bur, × 5, from no. 3474.

PLATE 1015, burs, × 2, and beaks, × 5, of X. GLOBOSUM Shull, X. ITALICUM Moretti, X. INFLEXUM Mackenzie & Bush and X. CHINENSE Miller. FIGS. 1 and 2, X. GLOBOSUM, from plant raised by Sherff from seed of TYPE. FIGS. 3 and 4, X. ITALICUM, from Venetia, *Béguinot* in Fl. Italica Exsicc., no. 2774. FIGS. 5 and 6, X. INFLEXUM, from Courtney, Missouri, *Bush*, no. 1806. FIGS. 7 and 8, X. CHINENSE, from Ogdensburg, New York, *Phelps*, no. 1215.

PLATE 1016, burs of X. CURVESCENS Millspaugh & Sherff and X. LEPTOCARPUM Millspaugh & Sherff, smaller figs. × 2, larger, × 5. FIGS. 1–4, X. CURVESCENS: FIGS. 1 and 2, from TYPE; FIGS. 3 and 4, from Burlington, Vermont, Sept. 8, 1918, *N. F. Flynn* (identification by *Sherff*). FIGS. 5 and 6, X. LEPTOCARPUM, from TYPE.

PLATE 1017, burs of X. ORIENTALE L., figs. 1, 3, 5 and 7, × 2, others × 5; FIGS. 1 and 2, from Austria, *Fritsch* in Fl. Exsic. Austro-Hung., no. 3068; FIGS. 3 and 4 (2 burs), from France (as *X. macrocarpum* DC.), ex Herb. Cosson-Germain; FIGS. 5 and 6, from Richelieu River, St. Hilaire, Quebec, *Pease*, no. 12,955; FIGS. 7 and 8, from LaTortue, Quebec, *Victorin*, no. 21,254.

PLATE 1018, X. ECHINATUM Murray: FIG. 1, fruiting branch, × 1, from Revere, Massachusetts, Sept. 17, 1882, *Herbert A. Young;* FIG. 2, margin of large leaf, × 1, from Marshfield, Massachusetts, August 28, 1898, *C. H. Morss;* FIG. 3, bur, with arching beaks, × 2, from Tisbury, Massachusetts, *F. C. Seymour*, no. 2029; FIG. 4, summit of bur, × 5, from no. 2029; FIG. 5, bur, with tightly crossing beaks, × 2, from Newcastle, New Hampshire, Sept. 19, 1901, *E. F. Williams;* FIG. 6, summit, × 5, of same bur as in fig. 5.

PLATE 1019, X. VARIANS Greene: FIG. 1, portion of ISOTYPE, × 1; FIG. 2, bur, × 2, from The Dalles, Oregon, *Suksdorf*, no. 193; FIG. 3, summit of bur, × 5, from no. 193.

PLATE 1020, HELIANTHUS ATRORUBENS L., var. ALSODES Fernald, all figs. from TYPE: FIG. 1, plant, × ⅜; FIG. 2, pubescence of base and petioles, × 2; FIG. 3, involucre, × 2.

PREVIOUSLY UNREPORTED PLANTS FROM MINNESOTA.—POA TRIVIALIS L. Several years ago Dr. C. O. Rosendahl collected *P. trivialis* growing in association with *P. sylvestris* Gray and *Milium effusum* L., in northeast Iowa, less than one mile from the Iowa-Minnesota state line. It appears to be the closest known station to that of Duluth. On July 19, 1945, the writer discovered the species on the bank of Tischer Creek at the foot of

Hunters Hill. Collection no. 6007 was made from a colony growing in wet moss in deep shade under willows, not far from a colony of *Listera auriculata* Wieg., a rare orchid in Minnesota. *P. trivialis* is an interesting addition to the adventive flora established on the higher slopes of Hunters Hill, e. g. *P. Chaixii*, *P. nemoralis*, *Milium effusum* and *Luzula nemorosa*.

Helenium nudiflorum Nutt. is extending its range farther into the interior west from Michigan and north from Missouri. In Minnesota the writer discovered a colony of the species on Highway 23, about two miles south of the Holyoke Junction, in Carlton Co. Collection Lakela no. 5860 was made on Sept. 4, 1944, from a colony of scattered individual plants growing in shallow moss-mats with species of *Juncus* and *Carex*, along a partly cleared border of the roadside thicket.

Equisetum arvense L., f. campestre (C. F. Schultz) Klinge was discovered in water-filled depressions made by removal of sod, in a brookside-meadow northwest of Woodland Ave. in Duluth. Specimens no. 5985 collected June 23, 1945, have more chlorophyll-containing tissue in fertile stems than later formed plants. Strobili continued to develop through August. The writer is obliged to Dr. R. M. Tryon, Jr., University of Minnesota, for determination of the form.—Olga Lakela, Duluth State Teachers College.

BIDENS HYPERBOREA VAR. TYPICA

Norman C. Fassett

Bidens hyperborea was described in 1901[1] from material collected at Rupert House, James Bay, by J. M. Macoun in 1885, and its specific identity with plants on estuaries from the St. Lawrence to New England was later demonstrated.[2]

"The treatment of this variable species by the present writer (1925c)[3] can be regarded only as tentative. Var. *typica* Fassett came from Rupert House, James Bay, Canada, and is described as being simple and monocephalous, with entire or few-toothed leaves. Plants matching this description were collected by Svenson and Fassett on the estuary of the Restigouche River,

[1] Greene, Pittonia iv. 257 (1901).
[2] Fernald, Rhodora xx. 146–150 (1918).
[3] Fassett, Rhodora xxvii. 166–171 (1925).

New Brunswick; this collection is cited (Fassett, 1925c) as No. 889 under var. *laurentiana*. The unbranched plants with small achenes formed colonies distinct from those of the larger variety also present on this estuary, and were considered in 1925 to be mere dwarfed forms of it. This is probably the case, but it is possible that the type collection from James Bay, the only collection known, may represent small forms of a larger plant present on the estuaries of rivers entering Hudson Bay. The final word may not be spoken until complete collections have been made in that region."[4]

Copious collections of *Bidens hyperborea* have recently been made by Rev. Arthème Dutilly, O.M.I. and Rev. Ernest Lepage, at Rupert House and East Main River; while it would be over-optimistic to try to speak "a final word", these collections show conclusively that the type material *does* represent only dwarfed forms such as may be found in almost any colony of any species of *Bidens*. These new collections total 46 individuals, of which 16 are simple and monocephalous like the type, 17 are slightly branched above, and 13 are copiously branched. The leaves, except on the smallest individuals, are conspicuously toothed, and the achenes are for the most part definitely larger than those of the type specimens, the outer being 4.5–7.5 mm. long, the inner 6.0–9.0 mm. long, and the awns 3.0–4.5 mm. long. In short, just as small individuals of var. *laurentiana* are inseparable from the type material of *B. hyperborea*, so well-developed plants from the type locality are inseparable from similar individuals of var. *laurentiana*. *B. hyperborea* var. *laurentiana* Fassett, Rhodora xxvii. 169 (1925), therefore becomes a synonym of *B. hyperborea* var. *typica* Fassett, l. c., p. 167.

The Dutilly & Lepage collections, all of which have been loaned to me by Father Lepage, are as follows: Rupert House, 51° 30′ N., August 31–September 2, 1944, nos. 13576, 13633 & 13660; East Main River, 52° 15′ N., August 28–29, 1944, nos. 13485 and 13522. For the loan of the type of *Bidens hyperborea* from the National Herbarium of Canada I am indebted to Dr. A. E. Porsild.

Department of Botany,
University of Wisconsin

[4] Fassett, Proc. Boston Soc. Nat. Hist. xxxix. 103 (1928).

THE GENUS PALAFOXIA IN TEXAS

V. L. Cory*

My No. 31195, which I had labeled as *Palafoxia linearis* Lag., was determined tentatively by Dr. Blake as being *Othake macrolepis* Rydb. I know he was right in finding it not to be *P. linearis*, and my subsequent study of the material convinces me that he also was correct in using the interrogation mark after the *O. macrolepis*. Upon my request and in connection with a summary of my study of this material, Dr. Blake has made a further examination of the material and has reported that it seems to represent a valid new species.

Palafoxia **riograndensis,** new species. Plant annual; stems 3–4.5 dm. high, up to 5 mm. broad at base, strigose and hispid throughout, branched at base and above, the branchlets hispid and densely glandular, especially above; leaves linear, up to 5 cm. long and 3 mm. broad, petiolate, strongly hispid; petioles slender, 1 cm. long or less; peduncles slender, densely glandular, up to 6 cm. long, the shorter ones usually more than 2 cm. long; involucre narrowly turbinate-campanulate, about 1 cm. long and 0.5 cm. broad; involucral bracts in a single series, 4–6, usually 5, each closely embracing an outer achene, linear, hispid and glandular, 9–10 mm. long, with rose-colored tips; ray-flowers wanting; disk-flowers twice as many as there are involucral bracts, 5.5–6.5 mm. long, the corolla cleft nearly to the slender tube which is 2–2.5 mm. long, the lobes linear; achenes tapering downwards, 8–10 mm., usually about 9 mm. long, 0.7–0.9 mm. broad at apex, the inner and outer ones markedly different; outer achenes glabrate to sparsely strigose, epappose, or pappus minute, to 2–3 mm. long, or frequently cup-like with 4 very short lobes, usually less than 0.5 mm. long, not at all scarious; inner achenes densely pubescent, with 4 squamellae about 6 mm. long with strongly excurrent midrib and scarious margins.[1]

* Range Botanist, Texas Agr. Expt. Station, Sonora, Texas.

[1] Palafoxia **riograndensis** sp. nov. Annua strigosa hispida 3–4.5 dm. alta caule basi 5 mm. diam. ramosa, ramuli hispidi glandulosi. Folia linearia ad 5 cm. longa 3 mm. lata hispida petiolata, petiolis gracilibus 1 cm. longis vel brevioribus. Pedunculi graciles dense glandulosi ad 6 cm. longi (plerumque ultra 2 cm.). Involucra anguste turbinato-campanulata ca. 1 mm. longa 0.5 cm. lata. Phyllarii uniseriales 4–6 (plerumque 5) achaenia exteriora amplectentes lineares hispidi glandulosi 9–10 mm. longi apice rosei. Corollae ligulatae desunt; disci corollae ca. 10, 5–6.5 mm. longae profunde lineari-lobatae fere ad tubum gracilem 2–2.5 mm. longum. Achaenia basi angustata ca. 9 mm. longa apice 0.7–0.9 mm. diam. interiora ab exterioribus perspicue differentia, exteriora glabrata vel parce strigosa epapposa aut pappum minutum ad 2–3 mm. longum aut brevissime quadrilobatum ad 0.5 mm. longum nec scariosum gerentia; interiora dense pubera squamellas 4 ad 6 mm. longas costa excurrente marginibus scariosis gerentia.

TYPE specimen is designated as No. 31195, which is deposited at the Gray Herbarium, and isotype material is deposited at other herbaria. This collection was made on October 26, 1938, in a flat wash near the Rio Grande about three and one-half miles southeast of Presidio in Presidio County, Texas. We have seen this plant nowhere else, but it is assumed to grow elsewhere along the Rio Grande in the Big Bend Area of Texas, and in strong probability to occur more widely and in greater abundance across the river in Mexico. It seems fitting to associate the species in name with the river along which it grows.

Othake macrolepis Rydb., a species occurring 550 or more air-line miles north-northeast in Bent County, Colorado, has been reported from Texas: *Demaree* 7723, three miles north of Lubbock, May 27, 1930. Lubbock is approximately 325 miles from Presidio and only about one hundred twenty-five miles from the Colorado locality. I have not seen Mr. Demaree's specimen, but I presume it is well authenticated. In *O. macrolepis* the heads are said to be short-pedunculate, whereas in *P. riograndensis* they are relatively long-pedunculate. Among other differences between these two species ours has much narrower leaves (ca. 3 mm. vs. ca. 8 mm.), a lesser number of involucral bracts (5 vs. 8–12), shorter corolla-tube (2–2.5 mm. vs. 5 mm.), longer achenes (9 mm. vs. 7 mm.) and fewer squamellae (4 vs. 6–8).

The pappus of the new species is more nearly that of *Palafoxia linearis* than that of *Othake macrolepis*, and one well-known botanist did as I did by referring my material to *Palafoxia linearis* largely through this character. It would seem that this linking of two species, which some botanists consider as being of different genera, would be good support for placing these three species in a single genus, and this necessarily would be *Palafoxia*. In treating the Rio Grande species in this manner, it seems well to propose new combinations for those species known from Texas hitherto as being of the genus *Polypteris* and *Othake*.

Recently I have examined the publication, *A MONOGRAPHIC STUDY OF THE GENUS PALAFOXIA AND ITS IMMEDIATE ALLIES* by Elizabeth Ammerman Baltzer in which the treatment given is substantially that of Rydberg in the NORTH AMERICAN FLORA. The author did not have Demaree's plant from Lubbock, nor did she have my plant from Presidio.

In my opinion she is right in considering *Othake robustum* Rydb. as being a variety of *O. roseum* Bush, but I do not agree with her in placing *O. macrolepis* Rydb. as a variety of *O. texanum* (DC.) Bush. From this viewpoint five new combinations for Texan species are required.

Palafoxia **rosea** (Bush), new comb. *Othake roseum* Bush in Trans. Acad. Sci. St. Louis **14:** 175, 1904.

Palafoxia rosea, var. **robusta** (Rydb.), new comb. *Othake robustum* Rydb. in N. Am. Fl. **34,** Pt. 1, 60, 1914.

Palafoxia **macrolepis** (Rydb.), new comb. *Othake macrolepis* Rydb. in Bull. Torr. Bot. Club. **37:** 332. 1910.

Palafoxia **Reverchonii** (Bush), new comb. *Othake Reverchonii* Bush in Trans. Acad. Sci. St. Louis **14:** 180. 1904.

Palafoxia **sphacelata** (Nutt. ex Torr.), new comb. *Stevia sphacelata* Nutt. ex. Torr. in Ann. Lyc. N. Y. **2:** 214. 1828.

I am indebted to Dr. I. M. Johnston and to Dr. S. F. Blake for critical study of the plant material, and to Dr. L. H. Shinners for assistance in preparation of the Latin description.

Present address:

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The North American Representatives of Alisma Plantago-aquatica.—To one who has long known the two broad-leaved representatives of *Alisma Plantago-aquatica* L. in North America it is a surprise to see growing in Europe the typical plant, for it commonly has lilac or roseate petals (our two plants with them white), while the stamens, ovaries and styles are markedly different from ours. To be sure, the late Professor Gunnar Samuelsson treated our larger-flowered northern plant as a North American subspecies, *A. Plantago-aquatica,* subsp. *brevipes* (Greene) Samuelsson in Arkiv för Bot. xxiv[A], no. 7: 19 (1932), based upon *A. brevipes* Greene, Pittonia, iv. 158 (1900). When we compare the latter plant (which occurs across North America, from Quebec to British Columbia, south to Nova Scotia, New England, Maryland, Michigan, Iowa, Nebraska, New Mexico, Arizona and northern Mexico) with true Old World *A. Plantago-aquatica*, surprisingly definite characters are found to separate them. These are concisely stated below:

True ALISMA PLANTAGO-AQUATICA. Petals commonly lilac or roseate, sometimes white; anthers 1–1.25 mm. long; style 1–1.25 mm. long, erect, straight, median at summit of flowering carpel, the latter tapering to style.

A. TRIVIALE Pursh, Fl. Am. Sept. i. 252, mostly (1814). *A. brevipes* Greene. Petals usually white; anthers 0.6–0.8 mm. long; style 0.5–0.7 mm. long, strongly curved, borne at ventral side of summit of margin of the flowering carpel, the dorsal keel of the latter broadly rounded.

It would seem that our boreal *Alisma triviale* is well distinguished from the Old World plant.

The differentiation of our relatively northern *Alisma triviale* and the relatively southern *A. subcordatum* Raf. (Florida to Texas and Mexico, north to New England, New York, southern Ontario, Michigan, Wisconsin, Minnesota and Nebraska) was made by Pursh. Michaux, Fl. Bor.-Am. i. 218 (1803) had *A. Plantago* only from Canada, where *A. triviale* abounds. Pursh, Fl. Am. Sept. i. 252 (1814), took over, with unimportant change, Michaux's diagnosis of the Canadian plant, citing Michaux as his basis, but stretching the range from "Canada to Florida", with the new name *A. triviale*. Then from "New Jersey and Pennsylvania" his new *A. parviflorum* (p. 253) with "flowers small". It is quite evident that Pursh intended the larger-flowered and generally more northern plant as *A. triviale*, the smaller-flowered and generally more southern plant as his *A. parviflorum*. Rafinesque, however, had already defined the latter in 1808 as *A. subcordatum*.

The essential bibliography and the best specific characters of the two follow:

A. TRIVIALE Pursh, Fl. Am. Sept. i. 252 (1814) in large part at least. *A. Plantago* sensu Michx. Fl. Bor.-Am. i. 218 (1803), not L. Syst. ed. 10, ii. 993 (1759). *A. Plantago*, ε. *americanum* Roem. & Schultes, Syst. vii. 1598 (1830). *A. Plantago*, var. *triviale* (Pursh) BSP. Prelim. Cat. N. Y. Pl. 58 (1888). *A. Plantago-aquatica*, var. *triviale* (Pursh) Farwell in Ann. Rep. Comm. Parks and Boulev. Detroit, xi. 44 (1900). *A. brevipes* Greene, Pittonia, iv. 158 (1900). *A. superbum* Lunell, Bull. Leeds Herb. ii. 5 (1908). *A. Plantago-aquatica*, ssp. *brevipes* (Greene) Samuelsson in Arkiv för Bot. xxiv[A]. no. 7: 19 (1932). *A. Plantago-aquatica*, var. *brevipes* (Greene) Victorin (wrongly ascribed to Samuelsson), Fl. Laurent. 615 (1935).—Flowers 9–13 mm. broad; sepals broadly scarious-margined, in anthesis 3–4 mm. long; petals 3.5–6 mm. long; stamens twice as long as ovaries; anthers ovoid, 0.6–0.8 mm. long; style about equaling carpel at anthesis; fruiting heads chiefly 4–7 mm. in diameter; achenes 2.2–3 mm. long.

A. SUBCORDATUM Raf. in Med. Repos. ii. 5 (1808). *A. parviflorum* [as *parviflora*] Pursh, l. c. 253 (1814). *A. Plantago*, β. *parviflorum* (Pursh) Torr. Fl. N. Mid. U. S. 362 (1824). *A. Plantago-aquatica*, var. *parviflorum* (Pursh) Farwell, l. c. (1900).—Flowers 3–3.5 mm. broad; sepals very narrowly margined, in anthesis 2–2.5 mm. long; petals 1–2 mm. long; stamens only slightly exceeding ovaries; anthers subspherical, 0.3–0.5 mm. long; style about one fourth as long as ovary; fruiting heads mostly 3–4 mm. broad; achenes 1.5–2 mm. long.—M. L. FERNALD.

THE SPORADIC APPEARANCE OF EPIPACTIS HELLEBORINE.—It has repeatedly been noted, since it first appeared as a naturalized plant in North America, that *Epipactis Helleborine* (L.) Crantz will suddenly appear in well known woodlands, wooded parks, ravines or thickets as a single individual, soon as several and in a few years as a relatively abundant species. This behavior is apparently not restricted to the American colonies, derived from European progenitors. Picking up, almost at random, Bentham's Handbook of the British Flora, ed. 4 (1878), I read (p. 457) under *E. latifolia* (L.) Sw., a variation of *E. Helleborine:* "Not unfrequent in Britain, but often appearing only in single specimens".—M. L. FERNALD.

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One of the larger colonies of ILIAMNA REMOTA var. TYPICA on Altorf Island (photograph by author, July 28, 1945).

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NOTES ON CERTAIN PLANTS IN THE GRAY'S MANUAL RANGE

Earl Edward Sherff

Plates 1021–1024

Iliamna remota Greene, Leaflets Bot. Crit. **1**: 206. 1906.—It is now more than eighteen years since this rare species, theretofore known only from an island in the Kankakee River (at Altorf, about nine miles northwest of Kankakee, Illinois), was discovered growing on Peters Mountain in Virginia. Strausbaugh & Core, in an early volume of Rhodora (**34**: 142. 1932), have presented, under the synonym *Phymosia remota* (Greene) Britton, an interesting account of its discovery at the latter habitat. Their paper was followed closely by another, entitled "*Phymosia remota* in captivity" (S. C. Wadmond, *op. cit.* 207). Both of these papers were so stimulating to lovers of our rarer plant species that it has seemed worth while to supplement them with certain additional notes and remarks.

Rev. E. J. Hill, who collected the first herbarium material June 29, 1872, was at that time a teacher in the Kankakee High School.[1] Apparently he did not realize for some years the importance of his find. It became referred to *Sphaeralcea acerifolia* Nutt. in Asa Gray's Synoptical Flora (**1**: 317. 1897). On August 1, 1899, Dr. Edward L. Greene revisited the exact locality where Mr. Hill had collected in 1872 and obtained more specimens. He later assigned them to his new genus *Iliamna*, in which he erected for them the new species *I. remota*. His cited

[1] For a good account of his long and fruitful life, see Mrs. Agnes Chase's article, with plate, Rhodora **19**: 61–69. 1917.

herbarium specimens were all of his own collecting (none by Hill), so of course the type specimen would be a plant by Greene.[2]

In 1908, Fernald, Rhodora **10:** 52, renamed Greene's Kankakee plant *Sphaeralcea remota*.

In 1912, Dr. N. L. Britton was concluding his revisional work upon Britton & Brown's Illustrated Flora (edit. 2) and wished to secure an ampler assortment of specimens of the Kankakee plant. He wrote to the authorities of Field Museum of Natural History (now the Chicago Natural History Museum) for aid. Dr. Jesse M. Greenman, then of that institution, accordingly undertook to journey to the type locality. The elderly Mr. Hill, then in his seventy-ninth year, and myself were invited to accompany him. Arriving in the forenoon of August 3rd at Altorf, just northeast of the island's upper end, we forded the river at a point somewhat upstream, using a horse-drawn carriage. Securing a boat on the opposite shore, we rowed to the southwestern shore of the island and anchored. We were led presently by Mr. Hill with surprising directness and accuracy to the very spot where he remembered having collected some forty years before. The plants of *Iliamna remota*—to use Greene's original name unmodified—were numerous and both Dr. Greenman and myself secured a few herbarium specimens (*Greenman* 3530, *Sherff* 1600) and ripe seeds for Dr. Britton's studies, also for distribution to various herbaria.[3] It may be added here that Britton published the new combination *Phymosia remota* the following year (Britton & Brown *loc. cit.* **2:** 522), and that, since then, several authors, among then Strausbaugh & Core (*loc. cit.*), have accepted Britton's name.

For some years before his death (in 1923), Dr. C. F. Millspaugh, the Curator of Botany in those days at Field Museum of Natural History, was keenly interested in the rare Kankakee plant (*cf.*

[2] Greene's description of the island's position as "some twelve or fifteen miles above the city of Kankakee" was inexact. The island was indeed "just opposite a small village [or what may once have been a village] called Altorf" as added by him, but the distance by road on either side of the Kankakee River measures roughly nine miles from the business center (particularly the courthouse) in Kankakee.

[3] Dr. Isaac Bayley Balfour, Regius Keeper of the Royal Botanic Garden at Edinburgh, was among those sent some of the seeds. He wrote me perhaps three years later that the seeds had been planted on the grounds of his institution and had resulted in large, beautiful, flowering specimens that seemed well established. (Those who attempt to germinate seeds of this species might well scarify them first, between pieces of emory paper, or else soak them for 24 hours before planting, as mentioned in the above cited paper by Wadmond.)

One of the many smaller colonies of ILIAMNA REMOTA var. TYPICA on Altorf Island (photograph by author, July 28, 1945).

Wadmond, *loc. cit.*). In 1916, on his suggestion, Mr. O. E. Lansing, Jr., of Field Museum, and myself were commissioned to make botanical trips to certain Illinois localities of special interest,[4] among them that on the Kankakee island. At this last locality we collected numerous specimens of *Iliamna remota* (*Lansing & Sherff* 8, on rocky, grassy slope at Altorf Island, Aug. 23), supplementing these with a liberal quantity of mature seeds. Returning to Kankakee, we were graciously escorted by the late Judge Arthur W. De Selm to his residence and shown a number of fine flowering and fruiting specimens of *I. remota* growing in his garden. These he had raised from seed personally obtained in the type locality several years before.

Shortly afterward, Clute (Amer. Botanist **26:** 127–129. 1920), writing under the caption, "The rarest American plant," told of finding, after long and what seemed destined to be an unsuccessful search in the type locality, "a single plant of the rare mallow." He removed this plant to his private grounds, where it grew vigorously. Reading further: "We secured an abundance of seeds and hope by another year to have done something toward modifying its rarity." Strausbaugh & Core (*op. cit.* 146) cited Clute's paper and stated that, if his observation was correct, "it must then be apparent that the Virginia station is now the only known place in the world where *Phymosia remota* [*i. e.*, *Iliamna remota* Greene] is growing as a wild plant, and since there are at the present time not more than 50 plants at this station the species must be regarded as an exceedingly rare one that may soon become extinct."

The experience recorded by Clute seemed to my mind somewhat astonishing. In 1912 and again in 1916 I had observed that the more elevated, flat, level stretch of land on the Kankakee island (sometines called Altorf Island) was cultivated as a corn field. The *Iliamna* plants were found beginning at the edge of the corn field and extending a few meters down the more or less steep and wooded slope leading to the river. They were, we may say, in a narrow belt of open-woods habitat. Since this narrow belt was below where a plough would ever strike, it had seemed logical to assume that even with continued cultivation of the

[4] It is a curious coincidence that one of these trips was described by me in the very issue of RHODORA containing Mrs. Chase's biographic sketch of Mr. E. J. Hill (vol. 19, April, 1917; see pp. 74 & 75).

plateau-like field adjacent to this foothold they would be able to persist.

Deciding at last to see for myself how *Iliamna remota* had fared on the Kankakee island, I made a return visit on July 23rd, 1945, to the type locality.[5] To my great delight, I found that farming had been abandoned and that there were several hundreds of *Iliamna* plants flourishing there. From a distance, they displayed in several places a massed effect and, in general habit, somewhat suggested hollyhocks. A good proportion were robust, several-stemmed, 1–1.7 meters tall, and abundantly flowered. The majority were on the open, level expanse of the island, where they may indeed have become re-established subsequent to a one-time cultivation. A fair proportion, however, were on the upper part of the marginal rocky, grassy slope where I had seen them in earlier years.[6] At the time of day the plants were visited (one to two hours before true noon) the temperature was above 90° F. and the sunlight very bright. The flowers were fully expanded, although Wadmond reported (*op. cit.* 209) that on cloudy days the flowers never opened fully. Some five dozen herbarium specimens were obtained (my no. 5021) for distribution to herbaria later on and one small living plant removed for my garden. The specimens were kept for more than four hours slightly moistened in a closed, standard-sized, metal household clothes-boiler, then put in a plant press. Their flowers had remained fully expanded meanwhile.

On the 28th of the same month, I returned to the type habitat, in company with Dr. G. S. Daston of the Chicago Natural History Museum. Photographs of the growing plants were taken (PLATES 1021 and 1022), two more plants were dug up for removal to my garden (where all three plants are now safely established), ripe seeds were obtained, and further observations were made. These may be given briefly: The soil was not gravelly as had been reported, but distinctly a brown, sandy clay.

[5] This time alone. Those who would visit this spot, if not good oarsmen, should have preferably a companion along. The river, while usually only 3 to 15 dm. deep in July and August, is very swift and has many treacherous currents, making progress uncertain and difficult.

[6] It seems likely that Clute and his companions who visited the island in 1920 went to the wrong part of it. The older plants have remarkably long, thick, mostly horizontal roots and on the grassy, unmolested slope there seems little reason why the plants should have appeared successively in 1872, 1912, and 1916, then vanished by 1920, and finally become established again by 1945.

Iliamna remota var. typica from *Sherff* 5021, type locality on Altorf Island, July 23, 1945 (photograph by author from specimen in Gray Herb.).

In open, level situations colonies were up to 5 meters or more across, and essentially a pure stand (pl. 1021), the individual stems not tending to sprawl as they did where plants were growing singly at the edge of the treeless plateau, on grassy slopes in partial shade. Commonly the plants were accompanied by the darkened and dead stems of the previous year (these show clearly in pl. 1022). Leaves nearly always had a broadly triangular terminal lobe, this widening regularly from apex to base and being subtended by wide, obtuse sinuses. A few plants had some leaves, especially on their branches, with terminal lobe oblong or subcuneately narrowed below and subtended with sharp sinuses, as shown in Strausbaugh & Core's plate for a Virginia plant. Some plants had numerous suberect, straightish, axillary branches ± 2 dm. long, but for most plants these were undeveloped or absent. The flowers had a very pleasing but delicate fragrance (indeed, the dried specimens after a lapse of three months are strikingly fragrant). The larger flowers measured easily 5 cm. in diameter. The petals were irregularly more or less emarginate and usually very inequilateral, with one terminal lobe much exceeding the other.

In 1936, Wiggins published "A Resurrection and Revision of The Genus Iliamna Greene" (Contrib. Dudley Herb. Stanford Univ. **1**: 211–230, pl. 20). Many data, references, and considerations advanced by him as being germane to a proper understanding of *Iliamna remota* and its congeners must be omitted here. I have been constrained, however, to follow Wiggins in taking up Greene's name *Iliamna remota* for the Kankakee plant, which, for more precise handling, may be known as var. **typica** (var. nov.)[7]. With the Kankakee plant, Wiggins merged the Virginia form, as indeed had been done by Strausbaugh & Core (*vide*

[7] Since preparing the text for this paper, I have learned of the recent remarkable discovery by Dr. S. W. Witmer of Goshen College, of the var. *typica* in Elkhart County, northern Indiana. Professor Witmer has very kindly sent me two specimens for examination and granted permission to announce his discovery. Under date of Nov. 23, 1945, he wrote: "One of these specimens I collected July 4, 1944, the day I discovered this species growing wild at the station to be mentioned below. The other specimen I collected from the same station on Aug. 28, 1945.

"These plants were found 2 miles east of New Paris, Elkhart County, Indiana, at a point where the Wabash R. R. crosses the Elkhart River. I located four colonies of these plants over a stretch of ground extending about 430 yards from the river eastward along the north side of the railroad right-of-way. The four colonies included about 73 more or less distinct clumps. On the latter date of collection many of the plants had grown between 5 and 6 feet tall."

supra). However, the Virginia plant was known to be montane in its habitat, while the var. *typica* had been thought of as a prairie plant. Thus, for example, Gleason, writing some years ago on the vegetational history of the middle-western United States (Annals Assoc. Amer. Geographers **12**: 39–85. 1922) mentioned "*Phymosia remota*" in particular as one of certain plants participating in the eastward advance of our prairies and therefore being "accompanied or followed by some specific evolution." "These plants," he added, "are now confined to the eastern arm of the Prairie Province but in each case have their nearest related species much farther west."

Suspecting that the Virginia plant might be distinct, I visited the Peters Mountain locality **at** Narrows, Virginia, in August, 1945, but was unable to locate a single specimen. Later, through the very kind aid of Mr. Henry H. L. Smith, Principal of the Narrows High School, the friendly and generous cooperation of Mr. James Hubert Browning, one of his Senior students, was enlisted. Mr. Browning instituted a fresh search upon Peters Mountain and within a week's time succeeded in finding, at an altitude of "900 feet above New River", *i. e.*, at about 2400 feet above sea-level, two plants. Six leaves and an abundance of ripe fruits were sent me for record purposes. The habitat was described as at Narrows.

Meanwhile, through the good offices of my warm personal friend, Dr. P. D. Strausbaugh, of West Virginia University, the further assistance of Dr. Earl L. Core of the same institution and of Dr. E. Meade McNeill of Concord College, Athens, West Virginia, was obtained. Indeed, it happened that Dr. Core, who was the actual discoverer of the Peters Mountain *Iliamna* in 1927, had ascended Peters Mountain as recently as the month before my own fruitless ascent, but during the time at his disposal was unable to find any specimens. That *Iliamna* might still be found, however, was thoroughly believed by Dr. McNeill who, on taking a class up Peters Mountain some nine years earlier, had found a colony of more than a hundred plants. Professor McNeill volunteered to revisit the mountain in an attempt to rediscover specimens. This he did with two companions shortly afterwards. Without much difficulty they finally came upon an area a few rods long, containing numerous individuals and small

clumps or even colonies. Early in October, 1945, spurred on by the enthusiasm and the zealous efforts put forth by Professor McNeill in my behalf, I visited Narrows once again and on Oct. 5th, in his company, ascended Peters Mountain to the newly discovered site. Specimens were obtained for our gardens, also for distribution to herbaria (*McNeill & Sherff* no. 1). Our ascent was made at a point 0.9 mile down (*i. e.*, north and northwest along) the highway (as measured, in the automobile, from the northeast end of the New River bridge at Narrows) along New River. We went up eastwardly and somewhat northwardly. Our plants grew at the very crest of the rocky ridge or shoulder of the mountain, the altitude being about 2500 feet (no specimens were found at 2000 feet, the altitude reported originally by Strausbaugh & Core)[8]. The habitat was of the open-woods type, with numerous shrubs and small or stunted trees such as *Crataegus*, and naturally permitted wind and light an easy access. The soil in the various patches of earth, often mere pockets in the rock, was a very black humus and when wet (as it was at the time of our ascent) appeared identical with the muck often encountered in swamp or marsh habitats of our prairie states. The plants all were in or just past their late fruiting state. In stature, they were much smaller than in var. *typica* of the Kankakee habitat. Their height was mostly 6–9 dm., not mostly 1–1.7 m. as in var. *typica*[9]. The leaves had blades seldom 1 dm. (and very rarely 1.25 dm.) broad or long, while in var. *typica* leaf-blades 1.5 dm. or more in length and breadth are common. Some specimens could be found with terminal leaf-lobe as described above for most leaves of var. *typica*, but the majority of leaves were as shown in Strausbaugh & Core's illustration (*loc. cit.*, fig. 1) and had the terminal lobe oblong or subcuneately narrowed below and subtended with sharp sinuses (see pl. 1024).[10]

[8] On my abortive trip in August I made extensive searches at levels of from 1900 to 2300 feet. Numerous outcropping rocks were observed, as described by Strausbaugh and Core for the habitat, but seemingly the habitat had been altered since their time because of heavy forest-cutting and subsequent reforestation. This change was remarked upon likewise by Core when he ascended in July.

[9] Strausbaugh and Core in their "description of the Virginia plant" gave the height as "0.6–2 m. tall, or taller," but neither Dr. McNeill nor I could find any plants appreciably over a meter tall.

[10] The terminal lobe is especially apt to be widened at or slightly below the middle, much as in some material of *Iliamna latibracteata* Wiggins of the western United States.

A subsequent examination of additional herbarium specimens from Peters Mountain, collected there by Fogg and by Sharp (and very kindly lent me by Dr. J. M. Greenman, Curator of the Herbarium of the Missouri Botanical Garden), has been made but no constant differences have been found in flowers or fruits. It appears that the Peters Mountain plants (*vide* pl. 1024) are specifically identical with the Kankakee plants (*vide* pl. 1023) but varietally distinct. I have named them after Dr. Earl L. Core who, as a member of the West Virginia University Botanical Expedition in 1927, discovered the first specimens:

Iliamna remota var. **Corei,** var. nov.—A varietate *typica* plantis humilioribus plerumque sub 1 m. altis foliis minoribus plerumque sub 1 dm. latis et lamina sub 1 dm. longis lobo terminali saepius oblongo vel infra subcuneate angustato et sinibus plus minusve acribus subtento differt.

Specimens examined: *James Hubert Browning*, at 900 feet above New River, end of Peters Mt., in Narrows, Virginia, September, 1945 (two plants found; leaves and fruits in Chi. Nat. Hist. Mus.); *John M. Fogg, Jr.*, 15047, alt. 3000 feet, on dry, wooded, rocky shoulder of Peters Mt., along New River north of Narrows, Jul. 17, 1938 (Mo. Bot. Gard.); *McNeill & Sherff* 1, in black humus or muck, among rocks at top of ridge, alt. about 2500 feet, Peters Mt., Narrows, Oct. 5, 1945 (type, Gray Herb.: isotypes, Carnegie Mus., 2 sheets; Chi. Nat. Hist. Mus.; Cornell Univ.; Delessert Herb.; Gray Herb.; Kew Bot. Gard.; McNeill Herb. in Concord Coll.; Univ. Minnesota; Mo. Bot. Gard.; N. Y. Bot. Gard., 2 sheets; Mus. Nat. Hist. Paris; Phila. Acad. Nat. Sci., 2 sheets; Stanford Univ., 2 sheets; U. S. Nat. Mus., 2 sheets; West Virginia Univ.); *Aaron J. Sharp*, on rocky exposure of Peters Mt., Narrows of New River, June 29, 1940 (Mo. Bot. Gard., 2 sheets); *West Virginia University Bot. Exped.*, Peters Mt., The Narrows (Carn. Mus.; N. Y. Bot. Gard., where dated Jul. 20, 1929).

Valerianella Chenopodifolia (Pursh) DC.—Deam (Fl. Indiana 890. 1940) cites definitely or positively a single locality in Indiana for this species, namely Studebaker's woods, St. Joseph County, where it was collected by Nieuwland in 1912 and again in 1919. For the past five years I have noted specimens growing at certain spots in bottom-land or flood-plain woods along Trail Creek, just south of U. S. Highway 20 and perhaps two miles southeast of Michigan City. One stand, covering a quarter of an acre or more near the bridge at a small cross-road,

ILIAMNA REMOTA var. COREI from *McNeill & Sherff* 1, alt. about 2500 feet, Peters Mt. at Narrows, October 5, 1945 (photograph by author from TYPE in Gray Herb.).

was so dense as to resemble somewhat a field of buckwheat (*Fagopyrum esculentum* Moench) in flower. Numerous specimens (my no. 5020, May 13, 1945) have been distributed to the larger herbaria.

MONARDA FISTULOSA VAR. TYPICA f. ALBESCENS Farw.—This white-flowered forma I have already noted elsewhere (Torreya **45:** 68. 1945) as occurring on a shady bank along South Broadway Road, near Hastings, Michigan, in the summer of 1944. Several dozen flowering stems were counted in the same spot, Aug. 5, 1945. Nowhere was there evident an intergradation with the typical purplish- or lavender-flowered form that abounded near by. Specimens were collected (my no. 5022) for distribution to the larger herbaria.

VERBASCUM PHLOMOIDES L.—Deam (Fl. Indiana 834. 1940) notes the recent discovery (about 1925) of *V. Phlomoides* in Indiana, at a place near Burnettsville. He cites several additional localities where he himself found it. I have kept no records but have observed it at several points along highways, in old pastures and near fences, in central and northwestern Indiana, in August, 1945, and north of Chicago Heights, Illinois, in September, 1945. Pennell (Scroph. E. Temp. N. Amer., Acad. Nat. Sc. Phila. Monogr. **1:** 173. 1935) gives Minnesota as the northwesternmost state for its range in the United States. In July of 1945, I chanced upon a locality in Michigan where it was the dominant or at least most conspicuous species for many acres of ground. This was an old field (D. McCallum farm) just north of the Pine Lake in the northwest quarter of Hope Township, Barry County. Specimens (my no. 5023) were collected on Aug. 6th for distribution to herbaria. Descriptions in manuals were read and compared with the actual specimens in the field. It became at once obvious that some authors had relied for measurements and other details all too much upon herbarium specimens. For *Verbascum Phlomoides* these are apt, in many respects, to be misleading.[11] The larger plants do not make herbarium specimens readily, because of their gigantic leaves

[11] *Cf.* Britton & Brown, Illustr. Fl. edit. **2.** 3: 174. 1913. Here the flowers are said to be "usually in a solitary elongated spike-like raceme." Yet in practically all of the larger plants there are several racemes arising from below the principal or central one. Indeed, it is because of the characteristic *candelabrum effect* thus produced that *V. Phlomoides* can so often be told at a considerable distance from the ubiquitous *V. Thapsus* L.

and their large multiple inflorescences. Consequently the collector turns to the smaller, more tractable plants for making specimens.

From the living plants the following notes were taken: Larger plants ± 2 meters tall and having the principal raceme 7.5–9.3 dm. long; often 12 or more long, erect branches from *at* to a few cm. *below* base of principal raceme and having a raceme ± 0.5 as long as principal one. Principal lower leaves (excluding basal ones) on these larger plants often 4.5–5 dm. long. The acuminate tip of the median and upper leaves is usually a conspicuous feature.

Centaurea maculosa Lam.—In 1908, Gray's New Manual (edit. 7) gave (p. 861) New England to New Jersey as the range for *C. maculosa* in the United States. Deam more recently (Fl. Indiana 1104. 1940) gave its range as extending west to Michigan, Wisconsin, and Minnesota. For Indiana he was reluctant to admit the species as being well enough established to deserve listing. In adjacent southern Michigan, however, I have seen several small colonies during the past four years and these all seemed thoroughly established, especially so in Barry County and at a country spot near Howell. My no. 5025 was collected in quantity near a fence in a hay field, one half mile east of Leach Lake, northeast of Hastings, Aug. 8, 1945.

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BOTANICAL VISITS TO FORTS CLARK, MANDAN AND UNION IN NORTH DAKOTA*

O. A. Stevens

Plates 1025 and 1026

Through the enthusiastic assistance and guidance of my friend, Roy N. Bach, I was able to visit the site of Fort Mandan where Bradbury and Nuttall collected in 1810 and that of Fort Union where Audubon collected and illustrated birds and mammals in 1843. Maximilian was also at Fort Union in 1833. His artist,

* Contribution from the Department of Botany, North Dakota Agricultural Experiment Station, published with the permission of the Director.

Bodmer, gave us an excellent illustration of Fort Union and of the Indians, fortunately just before they were decimated by small pox.

Maximilian (1) gave us the best general account and Bodmer's classic illustrations are the best of the Indians of that time, but botanical contributions of this trip were few. Special interest attaches to Audubon's visit from the fact that he had engaged Isaac Sprague as assistant artist. Asa Gray soon discovered Sprague and for many years he was Gray's illustrator. The beautiful figures (unlabeled) of *Penstemon albidus*, *Echinacea angustifolia* and *Psoralea esculenta* in Audubon's birds (2) are undoubtedly Sprague's work. In other figures, one is more in doubt how much Audubon modified the work of his assistant. In another paper (3), I have discussed this further.

On June 21, 1945, we reached the site of Fort Union on the bank of the Missouri, about thirty rods east of the Montana State line. A tall flag pole was erected by the Great Northern Railway in 1935. The North Dakota Historical Society purchased the site in 1938 and has recently constructed a stone marker. A few posts stand to mark the walls but a gravel pit of recent date came near to destroying the site before the State intervened. Much of the material of the original fort was removed and used at Fort Buford a few miles farther east. Here the powder house still stands and the site is preserved.

I wanted to collect something from the fort-site. What would it be? Certainly not the too prevalent *Conringia* or *Descurainia Sophia*. I noted only one plant of *Penstemon albidus* and decided on a bit of *Sphaeralcea coccinea*, *Collomia linearis* and the latest arrival, *Camelina microcarpa*.

A mile or two farther east we found a road leading into the hills where Sprague and Audubon botanized. *Penstemon albidus* was still rare. *Psoralea esculenta* was fairly common and Mr. Bach found one plant with 13 racemes. *Echinacea* was just showing flower buds. *Astragalus pectinatus* was in full bloom and *A. bisulcatus* well begun. It seems strange that Audubon would not have mentioned these for they are striking. A few miles farther north we saw really breath-taking views of *A. bisulcatus*—great clumps dotting the small flats just below the foot of the buttes.

The afternoon was hot and we did not feel very ambitious. A creeping plant attracted my attention as we started down the hillside. It was *Phlox alyssifolia* (No. 818), which I had seen in the garden of J. Clayton Russell at Beach, North Dakota. He had found it about 30 miles over in Montana but we had not yet collected it in North Dakota. Here it seemed to have flowered only sparingly. On some hills farther north it was in better condition, with faded flowers and finally one fresh one, 25 mm. wide. Dr. E. T. Wherry writes me that there is a specimen of it from Fort Buford in the Britton Herbarium at the New York Botanical Garden, also one from "Phinney, N. D.," collected by C. Lockwood in 1898, in the Field Museum Herbarium. We have been unable to trace this locality.

Just before leaving the first hill, I was astonished to come upon *Astragalus Drummondii* (No. 817), new to North Dakota. The single plant had been half eaten off. A few miles farther north, we found one more plant and still farther, many plants, about seven miles south of U. S. Highway No. 2 and about 15 miles west of Williston. It looks so much like the prevalent *A. pectinatus* that one could hardly stop to examine each clump, and this may be why it had not been detected earlier.

On June 22, Audubon (4) had written (2: 52): "found a number of wild roses in bloom, quite sweet scented, though single and of a very pale rose color." It was June 23, when crossing the river at Elbowoods, we came suddenly on a bank of the first roses, *R. Woodsii*. My impression at first was that they were quite uniform in color and distinctly paler than our eastern *R. blanda*, but later we noticed various hues, more like the familiar "*arkansana*."

On August 7, 1938, we visited the site of the Indian village at Fort Clark. Here, also, the botanizing was disappointing. Behind the village-site was as pure a stand of *Bouteloua gracilis* as one could wish to see. The lodge-rings and most of the village-site were covered with *Agropyron Smithii* and a few weeds, especially *Lactuca scariola* and *L. pulchella*. Between the circles was a heavy growth of *Iva xanthifolia* and *Chenopodium*. Audubon (4) wrote of the camp being overrun with *Chenopodium album*, but it was doubtless *C. Berlandieri*. I finally collected a single plant of *Euphorbia glyptosperma*, large enough for seven

Site of Big hidatsa Village just north of Knife River, near Stanton, N. D. Creater-like circles are lodge rings, with dark lines of weeds between. Bushes at lower left and upper right are *Shepherdia argentea*. Air photo by *Roy N. Bach*, 1941 (looking SE).

A detached clay butte on bank of Missouri River, above site of Fort Manuel Lisa and just below west end of proposed Garrison Dam. Formations and outwash from foot of butte in left foreground are very characteristic. *Opuntia* in grass and on small clay mounds at right. Single tree is probably *Fraxinus*, shrubs at left of it mostly *Shepherdia*. Shelf at base of butte has such plants as *Chrysothamnus*, *Artemisia longifolia*, *Gutierrezia* and *Eriogonum multiceps*. Dark line toward top of butte is a thin lignite coal seam. Photo by Stanley Saugstad, 1941. Courtesy N. D. Game and Fish Dept.

specimens (No. 384). The site of the large Indian village just north of the Knife River was chiefly in a farmyard pasture. Here also, *Iva xanthifolia* was one of the most conspicuous plants. It is strange how the lodge-circles still show, especially as seen from the air (PLATE 1025).

Much confusion has attached to the location of these historic places, especially that of "Fort Mandan," so often mentioned by Nuttall and Bradbury. In discussing *Arnica fulgens*, Maguire (5) has enlarged upon Pennell's error (6) in assuming that the Fort Mandan of Nuttall was the same as that of Lewis and Clark. The latter structure was already partly destroyed when the party returned from the west coast and the site later was washed away by the river. A marker has been established by the North Dakota Historical Society on higher ground. This is on the east ("north" of the journals), bank about three miles north of the present railway station of Fort Clark, which is on the west side or eight miles south of the mouth (where it enters the flood-plain) of the Knife River.

The "Fort Mandan" of Nuttall and Bradbury was about an equal distance north of the Knife River on the west ("south") side of the Missouri. It is more correctly known as Fort Manuel Lisa, a trading and administrative post operated by that noted character. Truax (7) has given the best discussion of its location. Some maps show a town named Mannhaven, which was a river grain-elevator there. The bluffs between this place and the Knife River are high and steep. Northward, the river swings to the west, leaving a wide "bottom." The "fort" was located in a sort of amphitheater formed by the confluence of several short, deep "coulees" or ravines. The immediate bluffs are of the "Bad Land" butte type, presenting bare clay walls on the most exposed places, but the north and more gentle slopes are well covered with vegetation. The present plan seems to be to locate the west end of a huge dam across the river about three miles above the site. This may destroy the natural appearance of the place and cause great changes in flora.

Eriogonum flavum is quite a common plant on the hills. *E. multiceps*, described from Maximilian's collections, which is more closely restricted to eroded clay slopes, grew on the buttes at the site. *E. pauciflorum* is also attributed to the region, but so far, I

have failed to find it. *Astragalus tenellus*, which seems to inhabit gravelly clay, was abundant on one ridge, and *Thermopsis rhombifolia* grew nearby on the clay slope. *Hedysarum boreale*, which had been overlooked until recent years, grew on the slope which was covered with *Juniperus horizontalis* and herbaceous plants. *Erigeron glabellus* grew on the protected side at the foot of the buttes and part way up the slope. This appears to be the characteristic habitat for it. We did not observe var. *asper* along the river. Both were reported by Nuttall as flowering in August, but this must have been an error, or possibly based on late individuals, for June is the normal time.

I had hoped to make extensive topotype collections of the Upper Missouri River plants, but completion of the project is very dubious and it seems desirable to record the preceding notes and a few on some of the plants. On June 29, 1941, we tried to find the small stream where Bradbury had described (8) the lilies on June 24, 1810, forming a "scarlet stripe as far as the eye could see." If one were to ascend the river to this point and then climb the bluffs, he would be amazed to see the rugged hills soon give way to rolling, fertile farm-land. After considerable wandering by car, we found only one coulee which seemed to fit Bradbury's description. There were only a few lilies present, though the date was right for them.

I have been especially interested in *Lactuca ludoviciana*. All descriptions state that it has yellow flowers, but my conclusion is that it never did have such. In my first years of botanizing in eastern Kansas, I had called the flowers blue. We were a little too early at Fort Mandan for this plant. In the lily coulee were a few plants with the first flowers just open. Fortunately we were at the right time of day, for I have watched them at Fargo and found them open only from about 9 to 11 A. M. The rays were pale lilac as I have found them elsewhere. They may be nearly white or bluish. In dried specimens colors are notoriously misleading. I have noted *L. scariola* appearing bluish when dry.

Nuttall's lack of localities and his vague references to plants which ranged "to the northern Andes" have led to many speculations as to how far he might have gone. It seems more probable that he did not go far enough to see even the bluffs of the Little Missouri. It is not likely that he often crossed the Missouri

Maguire (5) (p. 425) suggested that Nuttall might have reached the White Earth vicinity for *Arnica fulgens*. This is neither necessary nor probable. In traveling along the Missouri in 1945, we did find it most abundant in the high, open coulees in Williams County, but it occurs southward through North Dakota and locally eastward to the central part of the State. In 1943, we were astonished to find it near McCanna (No. 683) in Grand Forks County. There is a specimen in the Brenckle Herbarium collected in western LaMoure County in 1903. I did not succeed in finding it there in 1944, but it easily may have been exterminated by breaking or pasturing of the prairie. Dr. Brenckle writes me that it disappeared soon after he collected it.

(1) Maximilian's Travels in North America. In Thwaites, Early Western Travels. Vols. 22–25.
(2) Audubon, J. J. Birds of America, oct. ed., Vol. 7, 1844.
(3) Stevens, O. A. Audubon's Journey up the Missouri River, 1843. N. D. Hist. Quart. **10**: 62–82. 1943.
(4) Audubon, Maria R. Audubon and his Journals, 2 vols. 1898.
(5) Maguire, B. A Monograph of the Genus *Arnica*. Brittonia **4**: 386–510. 1943.
(6) Pennell, Francis W. Travels and Scientific Collections of Thomas Nuttall. Bartonia No. **18**: 1–51. 1936.
(7) Truax, A. L. Manuel Lisa and his North Dakota Trading Post. N. D. Hist. Quart. **2**: 240–246. 1928.
(8) Bradbury's Travels. In Thwaites, Early Western Travels, Vol. 5.

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POPULUS BALSAMIFERA OF LINNAEUS NOT A NOMEN AMBIGUUM

Ernest Rouleau

The binomial *Populus Tacamahacca* Miller has been generally accepted for the northern Balsam Poplar since Farwell published his note (8) on the nomenclature of *Populus balsamifera* Linnaeus. Sargent (36), Rehder (34), Redman (32, 33), Davy (6), Cansdale et al. (3) and Mansfeld (24) have also discussed the question and decided in favor of *Populus Tacamahacca* Mill. instead of *P. balsamifera* L., rejecting the latter as a *nomen ambiguum*. The major argument stressed by these authors for its rejection was the inferred basing of the Linnaean species upon a Catesby collection of *Populus deltoides* Bartram ex Marshall from Carolina. This opinion was not shared by House (12) and Valckenier-

Suringar (40). Houtzagers (14) has more recently re-examined the question but does not commit himself, accepting the names in use in recent manuals: *Populus Tacamahacca* for the Balsam Poplar and *P. deltoides* for the Cottonwood.

Moss (30) and Schinz & Thellung (37) have even gone so far as to reduce *Populus candicans* Ait. to the synonymy of *P. Tacamahacca* Mill. Farwell (8), following this conception, adopted the name *Populus Tacamahacca* var. *lanceolata* (Marshall) Farwell for our indigenous tree, so that the native Balsam Poplar has become a variety of a tree known in cultivation only. These authors have wrongly ascribed *Populus candicans* to the synonymy of *P. Tacamahacca*. Miller's original description (26) and figure (28) describe and illustrate staminate flowers: "The katkins are like those of the black Poplar, but the number of stamina in the male flowers is uncertain, from eighteen to twenty-two. The female flowers I have not fully examined, but by the male katkins I have been induced to place it in this genus". It is a recognized fact that *Populus candicans* Ait. is a cultivated tree, known only in the pistillate condition.

While preparing monographic studies in the section *Tacamahaca* of the genus *Populus* for North America, the author has had occasion to study this question.

Linnaeus' original description in Species Plantarum (16) was as follows:

balsamifera 4. POPULUS foliis subcordatis oblongis crenatis. *Hort. cliff.* 460. *Roy. lugdb.* 82.
Populus foliis cordatis crenatis basi nudis, petiolis teretibus. *Wach. ultr.* 294.
Populus nigra, folio maximo, gemmis balsamum odoratissimum fundentibus. *Catesb. car.* I. *p.* 34. *t.* 34.
Populus foliis ovatis acutis serratis. *Gmel. sib.* I. *p.* 152. *t.* 33.
Habitat in America *septentrionali.* ♄

It is worthwhile examining in detail each of the references given by Linnaeus.

1. Hort. cliff. 460 (15).

The description is as follows:

4. Populus foliis cordatis crenatis.
Populus nigra, folio maximo, gemmis balsamum odoratissimum fundentibus. *Catesb. ornith.* 34, *t.* 34.

Crescit in Carolina *Americes juxta aquas. Communicata ab Ill.* Boerhaavio.
Cum etiamnum apud nos non floruerit, sexum determinare nequeo. Tam similis est antecedenti ac umquam affinis, differt foliis magis cordatis, obtusis, foliisque balsamo obunctis; inter stipulas liquidissimum balsamum maxima in copia datur.

Consequently, it is evident that Linnaeus' description was based upon a specimen communicated to him by Boerhaave. The only North American Poplar cultivated then in Holland was the Balsam Poplar, the "Populus similis: Arbor: resinosa: altera" of Boerhaave (2), based on Bauhin (1), the "Tacamahaca foliis crenatis" of Hermann (10) and Plukenet (31). The descriptions of these pre-Linnaean authors refer to trees cultivated in Holland, at Leyden mostly. The references given by these authors to Monardes (29) and Hernandez (11) are based on the analogy of the resinous gum of the buds of the Balsam Poplar with the gum of *Bursera Simaruba* (L.) Sarg. or some allied species, known in Mexico and Central America as "tacamahaca" or "tacamaco". Many other plants received the name of "tacamahaca" for the same reason.

It should be noted that Linnaeus in his Species Plantarum does not limit the distribution of *Populus balsamifera* to Carolina (apparently taken from Catesby) but extends it to "America *septentrionali*".

Wein (43) gives an interesting discussion of the important question of the introduction of American trees into Europe.

Whether there is a specimen of this species in the herbarium of Clifford is not known to the author, though there is a TYPE-SPECIMEN in the personal herbarium of Linnaeus, which seems to have been generally overlooked. It was there when he was writing his Species Plantarum and bears his annotation "4. balsamifera". It is of a short shoot consisting of six leaves with rounded bases, two of which have the base a little subcordate and asymmetrical. This type matches very easily numerous collections of *Populus balsamifera* made in Canada and the United States. One will find an illustration of the type and a letter of Jackson attesting the authenticity of the type-specimen in Houtzagers (14). The Catesby reference will be discussed later.

2. ROY. LUGDB. 82 (35).

Royen only repeats the "specific name" found in Linnaeus' Hortus Cliffortianus and in Catesby's Natural History of Carolina.

3. WACH. ULTR. 294 (41).

4. Populus foliis cordatis, crenatis; basi nudis; petiolis teretibus. Populus foliis cordatis, crenatis. *Linn. hort.*

This description can apply only to the Balsam Poplar, the "petiolis teretibus" and "basi nudis" leaving little doubt.

4. CATESB. CAR. I, p. 34, t. 34 (4).

Populus nigra, folio maximo, gemmis Balsamum odoratissimum fundentibus.

The BLACK POPLAR of Carolina.

THIS Tree grows only near rivers, above the inhabited parts of *Carolina*. They are large and very tall. In *April*, at which time only I saw them, they had dropt their seeds; which, by the remains, I could only perceive to hang in clusters, with a cotton-like consistence covering them. Upon the large swelling buds of this Tree sticks a very odoriferous balsam. The leaves are indented about the edges, and very broad, resembling in shape the black Poplar, described by Parkinson.

Catesby's plate shows a vigorous shoot the leaves of which are truly cordate and toothed down to the junction of blade and petiole. The petioles, moreover, have at their junction with the blade a very strong rounded appearance. It may be safely assumed that it is a rather poor illustration of *Populus heterophylla* L. The unreliable characters of Catesby's plate enumerated above were certainly sufficient to mislead Linnaeus as to its identity, and to make him think it represented a vigorous shoot of the Balsam Poplar. Specimens of *Populus heterophylla* in the Gray Herbarium match perfectly Catesby's plate (*i. e.* the long shoots).

Catesby's specimen preserved in the British Museum has little to do with his illustration. It is a well developed short shoot of *Populus deltoides* (certainly not collected in April) with deltoid leaves and crenate teeth which begin at a comparatively long distance from the junction of blade and petiole (as is the case in the section *Aigeiros*).

From Catesby's description, supplemented by a more detailed one (5) wherein he states "Its leaves are large, smooth on one

side . . . The foot-stalks are long, remarkably flat, and of a reddish colour, as are the larger veins of the leaves . . . ", it is evident that the plate and the specimen in the British Museum represent two different species. The plate represents *Populus heterophylla* and the description is a mixture of characters of *Populus heterophylla* and *P. deltoides*. Linnaeus seems to have relied more on the plate than on the description.

5. Gmel. sib. I, p. 152, t. 33 (9).

This reference to Gmelin is to a Poplar of section *Tacamahaca* which has been later segregated as *Populus suaveolens* Fischer.

Through the "doctrine of residues", we must keep the name *Populus balsamifera* for the major element included by Linnaeus in his description, *i. e.* the common American Balsam Poplar of which there is a type specimen in the Linnaean herbarium. This name (excl. syn. Catesby and Gmelin) should be reinstated for the tree which for the last quarter of a century has been passing as *Populus Tacamahacca* Miller.

Supplementary references or notes given by Linnaeus in literature subsequent to the Species Plantarum make even clearer what tree he was describing.

In his Systema Naturae, eds. 10 and 11 (19, 20), the description is as follows:

balsamifera 4. P. fol. ovatis crenatis. *Duham. arb.* 2. *t.* 182. *f.* 6. *Trew. ehret. t.* 46.

Linnaeus changes his "specific name". The adjective *ovatis* is more in harmony with the short-shoot leaves of *Populus balsamifera*. The reference to Duhamel's figure (7) is to that of a leaf of the American Balsam Poplar. Similarly, the reference to Trew (39) leads to a handsome colored plate of the American Balsam Poplar.

Again in his Systema Naturae, eds. 12 and 13 (21, 22), Linnaeus gives the following description:

balsamifera 4. P. fol. ovatis serratis subtus albidis, stipulis resinosis. Populus foliis subcordatis inferne incanis, superne atroviridibus. *Mill. dict.* 7. Tacamahaca foliis crenatis. *Pluk. alm.* 360. *t.* 281. *f.* 2. *Mill. dict. app. Trew Ehret. t.* 46. *Folia ovato-oblonga, subtus alba superficie vix conspicue tomentosa venis nudis reticulata.*

It is very interesting to note that here Linnaeus himself cites Miller (25). In the eighth edition of his Gardener's Dictionary (where binomial nomenclature was adopted, at least in part), Miller repeats the same diagnosis for *Populus Tacamahacca* as the one given in the seventh edition (*i. e.* the reference given by Linnaeus). His more detailed English description differs only in phrasing from that given in the earlier edition. The other references have already been discussed.

Finally, in Species Plantarum eds. 2 and 3 (17, 18), we read:

balsamifera 4. POPULUS foliis subcordatis denticulatis. *Hort. cliff.* 460. *Roy. lugdb.* 82.
Populus foliis cordatis crenatis basi nudis, petiolis teretibus. *Wach. ultr.* 294.
Populus nigra, folio maximo gemmis balsamum odoratissimum fundentibus. *Catesb. car.* I. *p.* 34. *t.* 34. *Duham. arb.* 2. *p.* 178. *t.* 38. f. 6.
Populus foliis ovatis acutis serratis. *Gmel. sib.* I. *p.* 152. *t.* 33.
Habitat in America *septentrionali.* ♄

The "specific name" is again changed. The synonyms given are the same as those listed in Species Plantarum (ed. 1). The only addition is a reference to Duhamel which follows the one to Catesby. This indicates very well that Linnaeus believed Catesby's plate to represent the Balsam Poplar. Duhamel's description (7) leaves absolutely no doubt:

> . . . mais il n'y en a point qui en répande autant, & d'une aussi agréable odeur, que celui de l'espece à feuilles ovales, no. 6, qu'on nomme pour cette raison *Baumier*.
> Je n'en ai jamais vu de grand, ses feuilles sont ovales, plus larges du côté de la queue qu'à l'extrêmité, terminées en pointe, dentelées finement par les bords, vertes en dessus, d'un blanc un peu jaunâtre par dessous.

More evidence can be found in other authors. Thomas Martyn (27), who re-edited the Gardener's Dictionary of Miller, adds *Populus Tacamahacca* Mill. to the synonymy of *Populus balsamifera* L. for the following reason: "Mr. Miller's figure and description agrees with the American Tacamahaca as it appears in our gardens". Miller's plate (28), also reproduced in the ninth edition (27) of the Gardener's Dictionary, is a better-than-average illustration of the American Balsam Poplar. Willdenow (44) adds two post-Linnaean references: first to Wangenheim (42), whose illustration represents a short-shoot leaf of *Populus bal-*

samifera; second, to Houttuyn (13), who describes the North American Balsam Poplar. Other authors of this period (such as Muenchhausen, DuRoi, Burgsdorff and others) only repeat the references given by Linnaeus (including Catesby and Gmelin) in his works published after Species Plantarum (ed. 1).

From the above notes one can see that the citation by recent authors of *Populus balsamifera* Muenchhausen, DuRoi or Auct., not Linnaeus, as identical with *Populus Tacamahacca* Miller, is in reality *Populus balsamifera* Linnaeus sensu Linnaeus down to Farwell, Sargent, Rehder, etc., who rejected it as a *nomen ambiguum.* The assertion by only a few botanists that a Linnaean name is an ambiguous name or that it has been variously applied is not a sufficient reason for rejecting it.

The name *Populus balsamifera* L. (excl. syn. Catesby and Gmelin) which was correctly accepted and understood by most dendrologists (Loudon, Spach, Wesmael, Koch, Schneider, Henry, etc.) must be kept for the American Balsam Poplar.

Encouraging help and advice in the preparation of this article have been given by Messrs. Fernald and Weatherby of the Gray Herbarium, to whom the author expresses his heartiest thanks. A helpful background has also been acquired through the reading of Svenson's "On the descriptive method of Linnaeus" (38).

Bibliography

(1) Bauhin, C., Pinax Theatri Botanici, etc., p. 430. 1623.
(2) Boerhaave, H., Index alter Plantarum, quae in Horto academico Lugduno-batavo aluntur. Vol. 2, p. 211. 1727.
(3) Cansdale, G. S., Beak, P. G., and Day, W. R., The Black Poplars and their hybrids cultivated in Britain. Imp. For. Inst. Univ. Oxford, pp. 17–18. 1938.
(4) Catesby, M., The Natural History of Carolina, Florida and the Bahama Islands, etc., p. 34, t. 34. 1731. (second edition revised by Edwards in 1754, third edition revised by Edwards in 1771).
(5) Catesby, M., Hortus britano-americanus, or a curious collection of trees and shrubs, etc., p. 32, t. 61. 1763. (reprinted in 1767 under a different title, but only slightly differing from the original edition).
(6) Davy, J. B., Two suggested Nomina ambigua. Forestry, **10**: 166–168. 1936.
(7) Duhamel du Monceau, H. L., Traité des arbres et arbustes qui se cultivent en France en pleine terre. Vol. 2, pp. 178–182, pl. 38, fig. 6. 1755.
(8) Farwell, O. A., Necessary changes in Botanical Nomenclature. Rhodora, **21**: 101–103. 1919.
(9) Gmelin, J. G., Flora sibirica, sive historia plantarum Sibiriae. Vol. 1, p. 152, t. 33. 1747.
(10) Hermann, P., Paradisi Batavi Prodromus sive Plantarum exoticarum in Batavorum Hortis observatarum index. p. 379. 1689.
(11) Hernandez, F., Rerum medicarum Novae Hispaniae thesaurus seu plantarum, animalium et mineralium mexicanorum Historia, etc. p. 55. 1651.

(12) House, H. D., Annotated List of the Ferns and Flowering Plants of New York State. N. Y. State Mus. Bull. **254**: 258–260. 1924.
(13) Houttuyn, M. (Christmann, G. F. in), Des Ritters Carl von Linné vollständiges Pflanzensystem, etc., vol. 2, pp. 451–453. 1777.
(14) Houtzagers, G., Het geslacht Populus in vervand met zijn beteekenis voor de Houtteelt. pp. 61–69, 226–227. 1937.
(15) Linnaeus, C., Hortus Cliffortianus, etc. p. 460. 1737.
(16) Linnaeus, C., Species Plantarum, etc. (ed. 1), p. 1034. 1753.
(17) Linnaeus, C., Species Plantarum, etc. (ed. 2), p. 1464. 1763.
(18) Linnaeus, C., Species Plantarum, etc. (ed. 3), p. 1464. 1763.
(19) Linnaeus, C., Systema Naturae, etc. (ed. 10), vol. 2, p. 1294. 1759.
(20) Linnaeus, C., Systema Naturae, etc. (ed. 11), vol. 2, p. 1294. 1760.
(21) Linnaeus, C., Systema Naturae, etc. (ed. 12), vol. 2, p. 656. 1767.
(22) Linnaeus, C., Systema Naturae, etc. (ed. 13), vol. 2, p. 656. 1770.
(23) Linnaeus, C., Mantissa Plantarum Altera, Generum, etc., p. 499. 1771.
(24) Mansfeld, R., Zur Nomenklatur der Farn- und Blütenpflanzen Deutschlands. III. Fedde Rep. Spec. Nov. **46**: 59–64. 1939.
(25) Miller, P., The Gardener's Dictionary, etc. (ed. 7), no. 7. 1759.
(26) Miller, P., The Gardener's Dictionary, etc. (ed. 8), no. 6. 1768.
(27) Miller, P., The Gardener's Dictionary, etc. (ed. 9), no. 5, t. 261. 1797. (edited by Thomas Martyn).
(28) Miller, P., Figures of the most Beautiful, Useful and Uncommon Plants described in the Gardener's Dictionary, etc., pp. 174–175, t. 261. 1760.
(29) Monardes, N., Simplicium medicamentorum ex Novo orbe delatorum, quorum in medicina usus est, historia, etc. pp. 5–6. 1579 (Latin translation of an earlier work in Spanish language published in 1569).
(30) Moss, C. E., The Cambridge British Flora, vol. 2, p. 13. 1914.
(31) Plukenet, L., Opera omnia botanica in sex tomos divisa. IV. Almagestum botanicum, etc., p. 360. 1696.
(32) Redman, K., Nomenclature confusion of Populus candicans Ait. Journ. Am. Pharm. Ass., **31**: 140–141. 1942.
(33) Redman, K., Nomenclature confusion in the case of the Balsam Poplar or Tacamahac. Journ. Am. Pharm. Ass., **31**: 220–223. 1942.
(34) Rehder, A., Proposed amendments to the International Rules of Botanical Nomenclature. Journ. Arn. Arb., **10**: 55. 1929.
(35) Royen, A. van, Florae Leydensis Prodromus, etc. p. 82. 1740.
(36) Sargent, C. S., Notes on North American Trees. V. Journ. Arn. Arb., **1**: 61–65. 1919.
(37) Schinz, H. und Thellung, A., Weitere Beiträge zur Nomenclatur der Schweizerflora (V). (Beiträge zur Kenntniss der Schweizerflora (XV). Viert. Naturf. Gesell. Zürich, **60**: 349. 1915.
(38) Svenson, H. K., On the descriptive Method of Linnaeus. Rhodora, **47**: 273–302; 363–388, pl. 990–991. 1945.
(39) Trew, D. C. J., Plantae selectae quarum imagines ad exemplaria naturalia Londini in Hortis Curiosorum nutrita manu artificiosa doctaque pinxit Georgeius Dionysius Ehret, etc. p. 15, t. 46. 1756.
(40) Valckenier-Suringar, J., Die Anwendung der internationalen Nomenklatur-regeln. II.—Populus balsamifera, tacamahaca, candicans und deltoides. Eine kreuzweise Änderung von Namen. Mitt. Deut. Dendr. Ges., **41**: 29–33. 1929.
(41) Wachendorff, E. J. van, Horti Ultrajectini Index. p. 294. 1747.
(42) Wangenheim, F. A. J. von, Beitrag zur deutschen holzgerechten Forstwissenchaft die Anpflanzung Nordamericanischer Holzarten, etc., p. 85, pl. 28, fig. 59, 1787.
(43) Wein, K., Die erste Einführung nordamerikanischer Gehölze in Europa. II. Mitt. Deut. Dendr. Gesell., **43**: 119–138. 1931.
(44) Willdenow, C. L., Species Plantarum, etc., vol. 4, pp. 805–806. 1805.

Institut botanique, Université de Montréal.

Size, Shape and Number of Astragalus caryocarpus Fruits.—This species seemed to bloom in unusual profusion in the spring of 1945 and I noted much variation in color of flowers, from dark purple to pinkish and bluish hues. Fruits were produced in abundance and their apparent variation in shape suggested a study of them. Collections were made at two places in northern Richland County, North Dakota, July 7, and in Clay County, Minnesota, July 13. From July 18 to 21, collections were made in Morton and Slope Counties, North Dakota. In each case, 10 or more fruits were taken from 15 to 20 individual plants and carefully measured while fresh. The following table summarizes the results.

Place	No. of plants	Length			Average ratio, length-width		
		Aver.	Max.	Min.	Aver.	Max.	Min.
Leonard, N. D., 1	18	2.0	2.2	1.8	1.01	1.09	.91
Leonard, N. D., 2	24	2.0	2.3	1.5	1.05	1.15	.97
Muskoda, Minn.	15	2.0	2.2	1.9	1.01	1.09	.96
Mandan, N. D.	22	2.0	2.2	1.9	1.00	1.06	.96
Amidon, N. D.	15	1.8	2.0	1.7	.89	.91	.85

The specimens from Slope County seem to run a trifle shorter than the others but the difference is scarcely significant. The general trend is clear and the variation less than I had expected. The fruits are just about 2 cm. long, varying only from slightly longer than wide to the reverse. Thickness was measured for only a few and it seemed rather uniform, about three-fourths of the width.

Gray's Manual describes the fruits as "ovoid-globular, more or less pointed." This is certainly not true of our material. The usual outline is quadrate, occasionally slightly obovoid. Sometimes there is a distinct mucronation from the style-base, but more often only a faint point.

A large plant on a roadside cut in Emmons County, had an expanse of fully a meter and bore 163 fruits. Smaller plants found later were even more prolific. We wondered whether size of fruit might be related to number, but counts indicated this was not true. The usual number per main stem was only 1 to 5, but occasionally reached 15 or 20 on an individual stem. Three plants in Slope County bore 93, 110 and 124 fruits respectively, the last a plant with an expanse of about 3 dm.—O. A. Stevens, North Dakota Agricultural College, Fargo, North Dakota.

Spiraea latifolia var. septentrionalis in Virginia.—On September 9, 1945, in company with Bernice M. Speese and Earlene Atchison, the writer collected *Spiraea latifolia* (Ait.) Borkh., var. *septentrionalis* Fernald on the very top of Hawksbill Mountain (elevation of 4049 feet), Page County, Virginia. There a small but dense patch grew in soil among the rocks. Some of the plants were in flower; others were in fruit.

Specimens are in the Gray Herbarium (*Baldwin 5464*). They were identified by Prof. M. L. Fernald, who wrote in a letter of October 16, 1945: "This variety occurs on the Labrador Peninsula and in Newfoundland and south to the Magdalen Islands and subalpine and alpine regions of Mt. Katahdin, Maine, and the White Mountains, New Hampshire, also on Keweenaw Peninsula, Michigan. It is distinguished from true *S. latifolia* by the dense cylindric to ovoid panicles, without elongate lower branches, and the relatively large flowers. It is a nice addition to the mountain-flora of northern Virginia."—J. T. Baldwin, Jr., The Blandy Experimental Farm, Boyce, Virginia.

Helianthus—a Correction.—In a recent discussion of the confusion which has prevailed regarding certain species of *Helianthus* I became acutely infected by the germ of confusion and incorrectly cited, on page 79 of the April number of Rhodora, *H. rigidus*, forma *flavus* in the synonymy of *H. laetiflorus*, var. *rigidus*. *H. rigidus*, forma *flavus* = typical *H. laetiflorus* (with yellow disk).—M. L. Fernald.

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Vol. 48. June, 1946. No. 570.

NOTES ON AQUATIC AND PRAIRIE VEGETATION IN SOUTHWESTERN MINNESOTA[1]

R. M. Tryon, Jr. and J. W. Moore

During the course of plant collecting in Minnesota in 1945[2], it occurred to us that a trip to the southwestern part of the state might yield some interesting plant records. Early in the season some plants of western distribution were found in temporary rock pools on Sioux Quartzite in Cottonwood County. Knowing of the presence of similar conditions in Rock County we traveled down to Luverne with high expectations of making some worthwhile discoveries.

A few miles north of Luverne in Mound Township the Sioux Quartzite forms a series of gently rounded hills higher than the surrounding countryside. The southern extremity of the rock is marked by a sheer rock wall. On the top the glacial drift is very thin. The rock is close to the surface and exposed in many places. Numerous pools were present in the early summer between the low rock ridges and in shallow depressions. They occur dispersed in a typical rocky prairie habitat. Later in the summer these pools usually become dry.

Probably the unusually wet spring and early summer were responsible for the rich aquatic flora encountered. Dormant seeds had perhaps germinated for the first time in several years, since the area had been visited several times in the past and

[1] Contributions from the Herbarium of the University of Minnesota I.

[2] The field work was supported in part by a grant in aid of research from the Graduate School of the University of Minnesota.

many of the plants present this year were not represented in the collections previously made.

The distribution of species in Minnesota is based on specimens in the Herbarium of the University of Minnesota and published reports. Distribution outside of the state is based on current manuals and special treatments. All specimens cited are in the Herbarium of the University of Minnesota. Unless otherwise indicated collections were made by the authors on July 8, 1945, in Rock County, Minnesota. The following list includes five species and two forms reported for the state for the first time and seven species that are very rare in the state.

Around a fairly large rock pool about three miles north of Luverne the following plants were found growing:

ISOETES MELANOPODA Gay ex Dur., 17557, in mud; 17559, in 2–4 inches of water at a similar pool about a quarter mile southwest of the large pool. These collections represent the first evidence of the occurrence of this species in Minnesota.

SCHEDONNARDUS PANICULATUS (Nutt.) Trel., 17556. This grass grew in the prairie at the edge of the rock pool. A single collection of the species is represented in the University of Minnesota Herbarium: Pipestone, Pipestone County, July, 1895, *M. Menzel*. *Schedonnardus* was reported for Minnesota by Upham[1] as *Schedonnardus texanus* Steud. (*Lepturus paniculatus* Nutt.) as occurring on "Rocky hills, Mound township, Rock county, Leiberg." The nearest known occurrence for this species is in South Dakota.

HETERANTHERA LIMOSA (Sw.) Willd., 17554. This blue-flowered species is another aquatic which has not previously been reported for Minnesota. The species has been reported from South Dakota.

ELATINE TRIANDRA Schkuhr f. INTERMEDIA Seubert, 17551. This form, new to Minnesota, is the aquatic phase which grows in shallow water. It has been reported from Wisconsin and South Dakota. The species, *Elatine triandra*, was reported by Sheldon[2] as having been collected in pools near Cannon river, Burnside Township, Goodhue County, Minnesota, by A. P. Anderson, August, 1893. We have not been able to locate specimens of this, but is it likely that they represent f. *intermedia* as they grew in shallow pools.

CALLITRICHE HETEROPHYLLA Pursh, 17552. Although reported for Minnesota by Muenscher[3], this species was not pre-

[1] Upham, Warren, Catalogue of the Flora of Minnesota, p. 169, 1884.
[2] Sheldon, E. P., Minnesota Botanical Studies 1: 16, 1894.
[3] Muenscher, W. C., Aquatic Plants of the United States, p. 262, 1944.

viously represented from the state in the Herbarium. An additional collection with mature fruit was made later in the summer on October 19, 1945, *J. W. Moore & N. L. Huff*, 18431, in an intermittent creek at Mound Spring State Park, a short distance northeast of the rock pool under discussion.

LIMOSELLA AQUATICA L., 17548. One previous collection had been made in Minnesota: Pipestone, Pipestone County, June, 1895, *M. Menzel.*

PLAGIOBOTRYS SCOPULORUM (Greene) I. M. Johnston, 17553. The nearest known locality for this species is western South Dakota. Prior to this year it was not known to occur in Minnesota. Earlier in the season very young plants were obtained from a rock pool on a Sioux Quartzite outcrop in Delton Township, Cottonwood County, Minnesota, May 29, 1945, *J. W. Moore & J. W. Posz*, 16935.

HORDEUM PUSILLUM Nutt., 17550. This species is of rare occurrence in Minnesota. Upham[1] first reported the species from Blue Earth County as collected by Leiberg. Other collections from Minnesota are: Pipestone, Pipestone County, June, 1895, *Menzel* and May, 1932, *Fellows;* Brown County, July, 1938, *Rosendahl*, 6926.

The following species were associated with those listed above: *Koeleria cristata* (L.) Pers., 17561; *Carex Eleocharis* L. H. Bailey, 17564; *Juncus Dudleyi* Wiegand, 17562; *Allium canadense* L., 17566; *Delphinium virescens* Nutt., 17560; *Potentilla pennsylvanica* L. var. *strigosa* Pursh, 17565; *Linum sulcatum* Riddell, 17549; *Gratiola neglecta* Torr., 17555; *Verbena simplex* Lehm., 17558.

In a prairie pasture about four miles north-northwest of Luverne rock pool plants were again encountered; some were the same as those previously collected and some were additional ones. The water in some of these pools had evaporated leaving a moist layer of mud. Other pools still had an inch or two of water in them.

MARSILEA VESTITA Hook. and Grev., 17578. This was growing in some abundance at the margin of a pool. The only previous collection from Minnesota is: Pipestone, Pipestone County, September 15, 1938, *J. W. & M. F. Moore*, 10550.

ISOETES MELANOPODA Gay ex Dur., 17582.

MYOSURUS MINIMUS L., 17586. Previous collections are: Big Stone County, June, 1901, *Holzinger & Anderson;* Chippewa County, May, 1909, *Moyer;* Pipestone County, May, 1935, *Rosendahl et al.*, 3052.

[1] **Upham, Warren. Catalogue of the Flora of Minnesota, p. 169, 1884.**

TILLAEA AQUATICA L., 17584. This interesting little plant has escaped detection in Minnesota until now. According to the reported range for North America, our collection is a new record for both Minnesota and the Great Plains Region of the United States and Canada.

ELATINE TRIANDRA Schkuhr f. TERRESTRIS Seubert, 17585. The terrestrial form in drying mud is new to Minnesota.

HYDRANTHELIUM ROTUNDIFOLIUM (Michx.) Pennell, 17579. This species is also known from Lac qui Parle County where it was collected by Moyer and from Lyon County where it was collected by N. L. Huff.

LIMOSELLA AQUATICA L., 17581.

PLANTAGO ELONGATA Pursh, 17587. We are reporting this species from Minnesota for the first time, although there is one previous specimen preserved in the Herbarium: Pipestone, Pipestone County, June 15, 1931, *Fellows*.

The following species were collected at the same locality in the adjacent prairie: *Stipa spartea* Trin., 17574; *Hordeum jubatum* L., 17583; *Anemone canadensis* L., 17570; *Lepidium densiflorum* Schrad., 17571; *Rosa arkansana* Porter, 17572; *Scutellaria parvula* Michx., 17573; *Acerates lanuginosa* (Nutt.) Dcne., 17568; *Verbena simplex* Lehm., 17580; *Erigeron strigosus* Muhl. ex Willd., 17569; *Achillea lanulosa* Nutt., 17577.

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NOTES ON THE COMPOSITAE OF THE NORTHEASTERN UNITED STATES

III. INULEAE AND SENECIONEAE

ARTHUR CRONQUIST

My condensation of the Antennarias of the northeastern United States (RHODORA **47**: 182–184. 1945) has been criticized at some length by Fernald (RHODORA **47**: 221–235; 239–247. 1945). At the root of the trouble in *Antennaria* is the problem of apomixis. Some workers, especially those in Europe, have contended that each apomict should be treated as a distinct species, since it is self-perpetuating, and can, at least theoretically, be differentiated from all other apomicts by morphological minutiae. There are three noteworthy objections to such a pro-

cedure. First, it represents a radical departure from the traditional concept of a species, ill-defined though that concept may be. Second, even in apomictic groups, apomixis is not always obligatory. Occasional normal sexual reproduction may occur, or, in some part of the range, be quite common. Fernald has admitted this to be true in *Antennaria*. These sexually reproducing plants may transcend the variation of several apomictic races, as has been demonstrated in *Crepis acuminata* by Babcock and Stebbins. One is then faced with the choice between distinguishing as separate species the normally variable offspring of the sexual plants, or using apomixis itself as a specific criterion. Few botanists would defend either procedure, in theory. Third, the number of apomictic races may be so great that in practice it becomes impossible to distinguish them clearly. In a hypothetical case of completely obligatory apomixis, there is no doubt that apomict a and apomict z are readily distinguishable, even though they may occur in the same area. Apomicts d, g, o, and s, as they are successively discovered and studied, are likewise distinguishable, although the differences between them are not so great as between a and z. But when apomicts a, b, c, d, e, f, g, h, i, j, k, l, m, n, o, p, q, r, s, t, u, v, w, x, y, and z have been discovered and named, a wholly confluent series is formed. Having once started splitting, the worker must either continue to describe new species ad infinitum, or undo his previous work on the group. The latter rarely happens. It is apt to take a relative new-comer, with an unbiased viewpoint and no axes to grind, to plunge into things and restore some degree of sanity to the situation.

The alternative to treating each apomict as a separate species is to group them, insofar as possible, into units comparable in taxonomic significance, variability, and clarity of definition, with the ordinary sexual species. The principal difficulty here is that the normal specific lines may be obscured by the persistence, as apomictic races, of the occasional interspecific hybrids. It may then become necessary to admit more than the usual amount of intergradation between species, in order to obtain units otherwise comparable to the strictly sexual species. A recent treatment embodying this alternative approach is that of *Crepis* by Babcock and Stebbins. After the most intensive and thorough study

that has yet been given to a large American genus, these authors concluded that the only practical systematic approach was to admit the existence of numerous more or less distinguishable apomicts within a single species, while also admitting an unusual amount of intergradation between species.

In considering the Antennarias of the manual range, I was unable to distinguish consistently and with reasonable certainty the great mass of recent segregates. The characters, as shown by our specimens, are just not as constant as has been claimed. I therefore found it necessary to prepare a new and more conservative treatment. Although monographic study, making use of the material from all the major herbaria (which is beyond the scope of any floristic treatment) might conceivably warrant certain adjustments in my treatment of varieties, I am convinced that the entities considered do properly fall into only three well-founded and reasonably distinct species. The concluding paragraph of Stebbins' reply (RHODORA **38**: 367–369. 1936) to Fernald's reduction of *A. virginica* and its variety *argillicola* to varietal status under *A. neodioica* is wholly pertinent: "I recognize that there is overlapping between *A. virginica* and *A. neodioica* in some characteristics, but since I am aware of an equal amount of overlapping between *A. fallax* and *A. Parlinii* (particularly in the southern and western portions of their range), *A. neglecta* and *A. petaloidea* (chiefly in Wisconsin), *A. petaloidea* and *A. neodioica* (throughout the north central states), and *A. Parlinii* and *A. Brainerdii* (in central New York) I feel that, in he interests of consistency, the reduction of *A. virginica* to a variety calls for a similar reduction of *A. Parlinii*, *A. petaloidea*, *A. Brainerdii*, and probably other species now recognized in the floras of eastern North America."

It is my opinion that the first opinion expressed by Fernald regarding the validity of *A. virginica* is correct, and that Stebbins' subsequent comments are wholly justified. Stebbins' indication of the particular areas in which intergradation is most noticeable is of particular significance. It cannot be too strongly emphasized that apparently constant differences in one locality may be broken down completely in some area, if apomixis is involved. The plants which break down the differences between two otherwise well-characterized apomicts may be still other apomicts

(since potentially there is an apomict for every genotype) or they may be sexually reproducing plants showing the normal variability involved in cross-breeding. In either case the result is the same: differences which appear constant in one restricted area may vanish in some other area. With apomictic groups, even more than with sexual groups, therefore, the whole range of variability of the species, throughout its whole geographic distribution, should be considered before any program of segregation is initiated.

There are, however, some valid criticisms in Dr. Fernald's paper. I overlooked the existence on the Gaspé peninsula of two boreal and cordilleran species, *A. alpina* (L.) Gaertn. and *A. umbrinella* Rydb. These are the species which he reports as *A. vexillifera* and *A. subviscosa*, respectively. *A. vexillifera* Fern. is merely one of a host of recent segregates from *A. alpina* (L.) Gaertn., a highly variable circumpolar species. Doubtless several varieties should be recognized, but their taxonomy and nomenclature are yet far from clear. For the present I think it best to associate *A. vexillifera* Fern. with *A. alpina* (L.) Gaertn. var. *canescens* Lange.

Antennaria subviscosa Fern. appears to me to be identical with the northern and western *A. umbrinella* Rydb. This species is interesting in that it shows the most ideal transition, sometimes even on the same head, between the contrasting phyllary-types of the *A. alpina* group and the *A. dioica* group (including *A. neglecta*, *A. plantaginifolia*, *A. parvifolia*, *A. microphylla*, and others). In the former the cellular structure of the scarious part of the phyllary is more or less evident under 25 diameters magnification, and the pigment (varying from dirty green to brownish or nearly black) is in the cell walls. In the latter the cells are laterally compressed so that their raised walls are closely parallel and give the phyllary-tip a finely striate appearance, and the pigment, if any (mostly whitish or pink), is diffuse. Most of the western specimens of *A. umbrinella* have glabrous achenes, but *Hitchcock and Martin 5600*, from Nye County, Nevada, recently so determined by Dr. S. F. Blake, has them papillate, as in *A. subviscosa*. Since apparently no other characters are associated with it, papillosity of the achenes would seem to fail in this case as a specific criterion.

Two collections from the same station in western Minnesota form the basis for Dr. Fernald's inclusion of *A. aprica* Greene in the manual range. I concur in the identification of the specimens, which mark the eastern limit of the known range of the species. Unfortunately the name *A. parvifolia* Nutt. antedates *A. aprica* Greene and applies to the same species. This was pointed out to me recently by Dr. Blake, and I confirmed it by examining Nuttall's isotype at Philadelphia.[1] Of more than 30 specimens of *A. parvifolia* examined for achaenial papillae, about half were seen to be papillate at 25 diameters magnification, a few which seemed glabrous at 25 diameters were seen to be sparsely and minutely papillate when examined at 50 diameters, and the rest were apparently glabrous even at 50 diameters. In some cases specimens of the same collection, looking very

[1] Dr. Fernald informs me that Nuttall's material of *Antennaria parvifolia* at the British Museum contains plants of *A. rosea* Greene and *A. microphylla* Rydb., as well as *A. aprica* Greene, and suggests a need for further clarification. (It is my present opinion that *A. microphylla*, *A. rosea*, and a number of other western segregates properly constitute a single polymorphic species, but these names are here used in the more restricted sense.) In accordance with Article 52 of the Rules, it becomes necessary to settle upon one of these as the basic element of *A. parvifolia*, to which the name should be restricted. Both *A. microphylla* and *A. rosea* may be excluded on the basis of Nuttall's description. The leaves of *A. microphylla* rarely exceed 1 cm. in length, and are certainly not "half or three-quarters of an inch long . . . [and] somewhat rhomboidally spathulate". *A. rosea*, on the other hand, occasionally has leaves as large as those described by Nuttall, but may be excluded by its pink phyllaries. In the diagnosis of the species Nuttall says that the involucral bracts are yellow. In the more general discussion he says in one place that they are yellow, and in another that they are purple. Obviously here the two color-types are being included in the same species; just as obviously, the pink (or purple) type must be considered a subordinate element, since it is mentioned only in the general discussion and is definitely excluded by the preliminary diagnosis. It should further be noted that occasional otherwise representative specimens of *A. aprica* have a distinct pink cast to the phyllaries, but it is to be assumed that the part of the type-collection of *A. parvifolia* which Dr. Fernald refers to *A. rosea* is not of this nature. One further difficulty remains: both *A. microphylla* and *A. aprica* have white rather than yellow phyllaries. Either of these, particularly *A. aprica*, may develop a yellowish tint in drying, however, and it must be remembered that the drying equipment available to Nuttall was not up to present-day standards. Both *A. microphylla* and *A. rosea* reach the edge of their range in the vicinity of the type-locality of *A. parvifolia* ("On the Black Hills and plains of the upper part of the Platte"), and are there uncommon. *A. aprica*, however, abounds in that region. Except as noted above, Nuttall's description and comments apply very well to *A. aprica* Greene; one of the two exceptions may be explained by inadequate means of drying specimens, and the other by the inclusion of a definitely subordinate element (*A. rosea*) with the more characteristic specimens. Certainly Nuttall's description and comments are more applicable as a whole to *A. aprica* than to either *A. rosea* or *A. microphylla*. It therefore seems plain that the name ***Antennaria parvifolia*** Nutt. should properly be applied to that part of Nuttall's type which has pale phyllaries and comparatively large leaves (these leaves, incidentally, being much smaller than those of the common eastern species). This part is conspecific with *A. aprica* Greene, which is therefore reduced to synonymy.

much alike superficially, varied from apparently glabrous to evidently papillate. Although papillosity of the achenes is doubtless valuable in some cases as a taxonomic character, it seems that Mr. Porsild and Dr. Fernald have overestimated its importance. Linnaeus' maxim, "Characterem non constituere Genus, sed Genus characterem", is equally true of species.

In conclusion, the species of *Antennaria* known to occur in northeastern United States and the portion of adjacent Canada south of the St. Lawrence River, as I understand them, may be keyed as follows:

1. Involucral bracts brown or dirty blackish green throughout: leaves about 1.5–5 mm. wide; Gaspé, Que., and northward . . . *A. alpina.*
1. Involucral bracts (at least the inner) white or whitish toward the tip; leaves often much larger.
2. Upper surface of the leaves nearly or quite as densely hairy as the lower, glabrate, if at all, only in extreme age; Gaspé, Que., and northward; w. Minn. and westward.
3. Pistillate involucres mostly 5–7 mm. high; terminal scarious portion of the outer involucral bracts more or less discolored and brownish; Gaspé, Que., and northward . . . . . *A. umbrinella.*
3. Pistillate involucres mostly 8–11 mm. high; terminal scarious portion of the outer bracts, as well as the inner, white (or occasionally becoming yellowish in drying) and shining; w. Minn. and westward . . . . . *A. parvifolia.*
2. Upper surface of the basal leaves distinctly less pubescent than the lower, sooner or later glabrate; throughout our range (*A. solitaria* toward the south only).
3. Basal leaves and those at the ends of the stolons relatively small, less than 1.5 cm. wide, 1-nerved or obscurely 3-nerved . . . . . *A. neglecta.*
3. Basal leaves and those at the ends of the stolons relatively large, prominently 3–5-nerved, the larger ones 1.5 cm. wide or more.
4. Heads several . . . . . *A. plantaginifolia.*
4. Heads solitary . . . . . *A. solitaria.*

GNAPHALIUM PURPUREUM L. var. **purpureum,** var. nov. *Gnaphalium purpureum* L. Sp. Pl. 854. 1753, sens. strict.

Gnaphalium saxicola Fassett is as yet known from only a very few collections in Wisconsin, but is approached by occasional specimens from elsewhere in the range of *G. obtusifolium.* At least until a larger series of specimens demonstrates its morphologic and genetic discontinuity, it seems better treated as a variety of *G. obtusifolium.*

GNAPHALIUM OBTUSIFOLIUM L. var. **saxicola** (Fassett), comb. nov. *Gnaphalium saxicola* Fassett, RHODORA **33:** 75. 1931.

Erechtites megalocarpa Fern. was described from saline coastal marshes in Massachusetts. It has subsequently been reported from Rhode Island and Long Island, and specimens in the local herbarium of the New York Botanical Garden extend the known range to Ocean County, New Jersey. It differs from *E. hieraciifolia* (L.) Raf. in its fleshiness, broader heads, and larger achenes with more numerous nerves, as well as some minor and inconstant tendencies or trends. The succulence is not preserved in the herbarium, and dried specimens of the two are superficially very similar. The several technical differences would at first seem to be of specific importance, but a study of our material shows no real discontinuity. In this connection, it is interesting to note that Millspaugh and Chase (Field Mus. Pub. Bot. **3:** 146. 1904) describe the Yucatan plants of *E. hieraciifolia* as having achenes up to 3.8 mm. long, although Fernald, in noting the large achenes (4–5.5 mm.) of *E. megalocarpa* indicates that those of *E. hieraciifolia* are only 2–3 mm. long. It seems reasonable, therefore, to treat *E. megalocarpa* as merely a well-marked ecotype of saline coastal marshes.

ERECHTITES HIERACIIFOLIA (L.) Raf. var. **megalocarpa** (Fern.), comb. nov. *E. megalocarpa* Fern. RHODORA **19:** 24. 1917.

In trying to determine the differences between *Petasites palmatus* (Ait.) Gray and *P. vitifolius* Greene I was led into a general consideration of the *P. frigidus* group, to which they belong. The principal differences which have been used for taxonomic segregation within the group are in the size, shape, and lobing of the leaves, but it soon became apparent that these differences, while striking, are far from constant. The differences adduced by Rydberg in the relative lengths of the throat and teeth of the corollas of the perfect flowers are unstable and apparently wholly without taxonomic value.

It is my opinion that only two closely related species should be recognized in this group, namely *P. frigidus* Fries and *P. sagittatus* (Banks) Gray. Both species are variable, rendering a simple and concise statement of their differences most difficult. The leaves of *P. sagittatus* vary from merely a little wavy and callous-denticulate (especially in smaller specimens) to more commonly conspicuously dentate with 20–35 teeth on each side. Those of *P. frigidus*, on the other hand, vary from coarsely toothed, with

5–15 teeth on each side (in smaller forms), to more or less distinctly lobed (in larger forms), and then often with more numerous teeth. The venation, toothing, and lobing of *P. frigidus* is pinnipalmate in small forms, becoming progressively more strongly palmate in larger ones; in *P. sagittatus* the venation is pinnipalmate throughout, the leaves often becoming conspicuously longer than broad. These differences, while seemingly weak, are in practice sufficiently constant to leave very few if any doubtful specimens, and the two species can generally be distinguished at a glance.

The appearance of *P. sagittatus* is sufficiently characteristic so that only one segregate, *P. dentatus* Blankinship, has been proposed. This was reduced by Rydberg in the North American Flora. The extremes of variation in *P. frigidus*, on the other hand, seem so different that nearly a dozen segregates have been proposed. These rest almost entirely on foliar characters, however, and are seen to be confluent when a large series of specimens is examined. The facts were seen in their proper perspective as long ago as 1865, when Herder recognized two American and one European variety of *P. frigidus*, in addition to the circumpolar typical one. His summary of the situation is worthy of quotation: "Diese hoch-nordische Pflanze zeigt eine grosse Verschiedenheit in der Configuration und Zahnung ihrer Blätter, so dass, wenn man nur einzelne Exemplare aus einer Gegend hat, man leicht in den Fall kommt, auf ihre oft eigenthümliche Blattgestaltung hin, Arten zu gründen." It remains only to transfer his names from the segregate genus *Nardosmia* to *Petasites* and refer the more recent names to their proper places.

PETASITES FRIGIDUS (L.) Fries var. **genuinus** (Herder), comb. nov. *Nardosmia frigida* var. *genuina* Herder, Bull. Soc. Nat. Mosc. 1865: 372. *Petasites gracilis* Britton, Bull. N. Y. Bot. Gard. **2:** 186. 1901. *P. alaskanus* Rydb. N. Am. Fl. **34** (4)**:** 314. 1927. *P. Warrenii* St. John, Res. Stud. State Coll. Wash. **1:** 109. 1929. Leaves relatively small, pinnipalmately veined, coarsely and irregularly toothed, but only scarcely or obscurely lobed.

PETASITES FRIGIDUS (L.) Fries var. **corymbosus** (R. Br.), comb. nov. *Tussilago corymbosa* R. Br.[1] App. Parry's First Voy.

[1] Dr. Fernald in personal correspondence has raised a question as to the identity of *Tussilago corymbosa* R. Br. The original description is clear enough, noting that the leaf-lobes are equal to ⅓ to ½ of the "radius" of the leaf, and are themselves toothed,

279. 1824. *Nardosmia corymbosa* Hook. Fl. Bor.-Am. **1:** 307. 1833. *Nardosmia frigida* var. *corymbosa* Herder, Bull. Soc. Nat. Mosc. 1865: 372. *Petasites trigonophyllus* Greene, Leafl. **1:** 180. 1906. *P. vitifolius* Greene, loc. cit. *P. nivalis* Greene, Pitt. **2:** 18. 1889. *P. corymbosus* Rydb. Bull. Torrey Club **37:** 460. 1910. *P. hyperboreus* Rydb. N. Am. Fl. **34** (4): 312. 1927. *P. frigidus* var. *hyperboreoides* Hulten, Fl. Aleutian Isl. 328. 1937. Leaves mostly pinnipalmate, distinctly lobed, the lobes seldom extending more than half way to the base.

PETASITES FRIGIDUS (L.) Fries var. **palmatus** (Ait.), comb. nov. *Tussilago palmata* Ait. Hort. Kew. **3:** 188. 1789. *Nardosmia palmata* Hook. Fl. Bor.-Am. **1:** 308. 1833. *Nardosmia Hookeriana* Nutt. Trans. Am. Phil. Soc. II. **7:** 288. 1841. *Nardosmia frigida* var. *palmata* Herder, Bull. Soc. Nat. Mosc. 1865: 372. *Nardosmia speciosa* Nutt. Trans. Am. Phil. Soc. II. **7:** 288. 1841. *Petasites palmatus* var. *frigidus* Macoun, Cat. Can. Pl. **1:** 553. 1886. *Petasites speciosus* Piper, Mazama **2:** 97. 1901. *Petasites speciosus* var. *frigidus* Henry, Fl. S. Br. Columb. 311. 1915. *P. Hookerianus* Rydb. N. Am. Fl. **34** (4): 314. 1927. Leaves distinctly palmate, the lobes generally extending more than half way to the base.

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the teeth mucronulate. The leaf size given, 1½–2½ inches broad, is within the range of normal variation of the entity to which Hooker, Herder and I have successively attached the name, although many of the more southern specimens, in particular, are often much larger. A photograph at the Gray Herbarium of some fragments in the British Museum which are supposed to represent type material collected by Captain Sabine on Melville Island shows a plant similar in size, habit, and general characteristics to what has been assumed to be an isotype in the Gray Herbarium, the two being apparently of the same collection. Both of these differ from Brown's description, however, not only in the smaller leaves (barely 3 cm. wide in the Gray Herbarium specimen, apparently even narrower in the other), but also in having the leaves merely toothed, and seem to represent the typical phase of *P. frigidus* as understood by me. The flowering stalks do have the corymbiform inflorescence described by Brown (a character now generally conceded to be of no taxonomic value here), but in neither specimen is the accompanying basal leaf organically attached to the flowering stem. In the Flora Boreali-Americana Hooker distinguishes *Nardosmia corymbosa* (based on *Tussilago corymbosa* R. Br.) from *N. frigida* solely on its leaf-outline, and cites specimens by Parry, Sabine, and Richardson. Since Brown was describing plants collected on the Parry expedition as well as the Sabine expedition, the name may well have been founded partly or even wholly on the Parry collection. On the basis of Brown's clear and explicit description, in which he specifically contrasted the leaves of *T. corymbosa* with those of *T. frigida*, I find it difficult to believe that the specimen in the Gray Herbarium, or the specimen which Dr. Fernald has photographed in the British Museum is authentic material of *T. corymbosa*. There may have been an error in the labeling or the mounting, or the Sabine collection may have been mixed, since *Petasites frigidus* is certainly to be expected on Melville Island. In any case, the basal leaves accompanying the specimens mentioned at the Gray Herbarium and the British Museum can scarcely be considered to form part of the true type of *Tussilago corymbosa* R. Br. Under the circumstances, and especially since he evidently had authentic material at his disposal, I think it proper to continue Hooker's interpretation of the name.

As might be expected, the species increases progressively in size with amelioration of the habitat, so that var. *genuinus* is the most reduced, and the var. *palmatus* averages the largest. *P. speciosus*, of the Pacific coastal states, has the leaves a little less deeply lobed, on the average, than do the ordinary forms of the transcontinental *P. palmatus*, but the differences are slight and inconstant, and many specimens are quite indistinguishable.

More collections are needed before the precise limits of range of each variety may be defined. In general, the var. *genuinus* is the most boreal of the three, and the only circumpolar one. It is known to extend south in the high mountains to Washington. The var. *corymbosus* is found through much of the American range of var. *genuinus*, but extends farther south, reaching Gaspé, Que., Mich., and Minn. The var. *palmatus* is the most southern of the three, extending as far as Mass., on the east coast, and Calif., on the west.

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AMELANCHIER SPICATA NOT AN AMERICAN SPECIES

M. L. Fernald

(Plates 1027–1030)

The name *Amelanchier spicata* (Lam.) K. Koch has dodged in and out of American treatments of the genus but was supposed to have been finally dismissed by Wiegand in his critical studies of the genus, when he wrote in Rhodora, xiv. 123 (1912):

> Those who have seen these specimens and the type specimen of *Crataegus spicata* [of Lamarck, basis of *A. spicata*], as well as specimens of our Eastern American stoloniferous fine-toothed *Amelanchier* agree that they all appear to be one and the same thing. Flowers and leaves in the exsiccatae match those of this stoloniferous species as well as one could wish, as do also the flowers and leaves in the original descriptions. The original description of *C. spicata*, however, gives the height of the plant as from two to three times that of the native European species of *Amelanchier*, which, figured out, would mean about 2–5 m. [$6^3/_4$–$16^9/_{10}$ feet]. Willdenow gives the height as 2–2.5 m. In addition, Mr. Alfred Rehder has stated to the writer that the plant in European gardens commonly passing under the name *A. ovalis* [*A. ovalis* sensu Borkh., equaling *A. spicata*, not *A. ovalis* Medicus, the native European species] is not low and stoloniferous but tall and fastigiate.

Wiegand considered that *Amelanchier spicata* was "of hybrid origin" and, believing the European tradition that it came from Canada, he guessed that it might have been a hybrid of the tall and fastigiate or arborescent *A. canadensis* (L.) Medic. (*A. ob-longifolia* (T. & G.) Roemer) and the freely stoloniferous and colonial dwarf *A. stolonifera* Wiegand. The latter conjecture seems not well supported by the detailed characters of *A. spicata*, as shown by the photograph of the type taken by Professor Alfred Rehder, reproductions, × 1, of which are shown in our PLATE 1027, and the tall fastigiate habit sufficiently demonstrates that *A. spicata* has nothing, except generically, to do with the low and freely stoloniferous and loosely colonial shrubs of eastern North America.

In spite of this conclusive evidence from those who have long known the importance of such characters in the genus, the name *Amelanchier spicata* (Lam.) K. Koch suddenly pops up again[1] as indubitably belonging to three low ("0.3–2 m. tall") native North American "surculose colonial shrubs", *A. stolonifera* and *humilis* Wiegand and *A. austromontana* Ashe. Since this interpretation by Professor George Neville Jones is so at variance with those of Wiegand and of Rehder, while the photograph of the type of *Crataegus spicata* and Lamarck's original account of it show complete departure in foliage, flowers, fruit and habit from the characters of these three American species, it becomes necessary to check the type and the description of *C. spicata* (our PLATE 1027) with some care.

The aggregate *Amelanchier spicata* sensu G. N. Jones, not of anyone else, is defined, in part, as "Low surculose colonial shrubs 0.3–2 m. tall; . . . lateral veins 7–9 pairs, . . . distantly arranged . . . ; . . . sepals . . . usually recurved from the middle after anthesis". Now, if we examine Professor Rehder's photograph of the type of *Crataegus spicata* (portions shown in our PLATE 1027) it will at once be evident that the lateral veins do not stop at "9 pairs . . . distant", as defined by Jones, but exceed that maximum and, as compared with the really distant lateral veins of *A. stolonifera* (our PLATE 1029, FIGS. 3 and 4, and PLATE 1030, FIG. 2, both from the TYPE) are relatively approxi-

[1] In G. N. Jones, Am. Species of Amelanchier, Ill. Biol. Mon. xx. no. 2: 51 (1946). See review in this journal, pp. 129-134.

mate. Similarly, the TYPE of *A. humilis* (see Jones, plate XV) and what Jones takes as an isotype of *A. austromontana* (Jones, plate xvi) have the lateral veins fewer and more distant than in the type of *A. spicata*, besides more elongate blades with more uniformly subacuminate tips. In foliage, then, *A. stolonifera*, *humilis* and *austromontana* are very inadequate matches for the leaves of *A. spicata*. In the type of *A. spicata* (PLATE 1027, FIG. 2) the sepals and petals are erect, not a very convincing match for the "sepals usually recurved from the middle after anthesis" of the three American shrubs (see our PLATE 1029 FIGS. 1 and 2, and 1030, FIG. 1), while in ours the petals diverge. It is to me quite evident from the photograph of the type-specimen of *A. spicata* that in flowers, as well as leaves, it is not any of the American shrubs which Jones identifies with it, he saying (p. 57) "it becomes clearly evident that Lamarck's *Crataegus spicata* is the common and widespread small serviceberry of eastern North America". Wiegand, Rehder and others had already clearly shown that it is not, for the Lamarck shrub is fastigiate and up to 16 or more feet ("—5 m.") high, not a very convincing similarity to "Low surculose colonial shrubs 0.3–2 m. tall."

Lamarck's own account should be convincing:

> 8. ALISIER à épis, *Crataegus spicata. Amelanchier du Canada* à petites fleurs.
>
> Cet arbrisseau a beaucoup de rapport avec le précédent; mais il s'élève deux ou trois fois davantage. Ses feuilles sont pétiolees, arrondies, dentées, vertes en dessus, pâles en dessous, & glabres des deux côtés dans leur parfait dévéloppement. Elles sont alors à-peu-près aussi larges que longues, & ont un pouce & demi de diametre ou environ. Les fleurs sont blanches, petites, & naissent sur des grappes un peu étroites, qui ressemblent à des épis. Ces grappes sont munies de petites bractées linéaires, colorées, caduques, & qui sont plus longues que les pédoncules propres de chaque fleur; ce qui n'a point lieu dans l'espece précédente. Les pétales sont une fois plus courts que ceux de l'Amélanchier, & ses baies sont une fois plus grosses que les siennes, c'est-à-dire, ont au moins la grosseur des fruits du Prunelier ou Prunier épineux. On prétend que cet arbrisseau se trouve au Canada. On le cultive au Jardin du Roi & dans les jardins des Curieux, ainsi que le suivant. (*v. v.*)—Lam. Encycl. Meth. i. 84 (1783).

Immediately following this account Lamarck described as *Crataegus racemosa* the American fastigiate shrub or tree which was common in European gardens and which Linnaeus had de-

scribed as *Mespilus canadensis*, the species correctly called *Amelanchier canadensis* (L.) Medic., but known until recently as *A. oblongifolia* (T. & G.) Roemer[1], an American species to which various American students (Robinson, Rehder and others) have sometimes referred shrubs which Jones now places in his heteromorphic "*A. spicata*". If *Crataegus spicata* were, as we are now positively assured, "the common and widespread small serviceberry of eastern North America", in which Jones includes elements which others have considered variations of *A. canadensis* (*Crataegus racemosa* Lam.), it is astounding that Lamarck did not suggest the resemblance but distinctly said that his new *C. spicata* "has much the aspect of the preceding, but rising two or three times as high". As to "the preceding", it was the one native European species (our PLATE 1028) of *Amelanchier*, the type of the genus, *Mespilus Amelanchier* L., called by Lamarck *Crataegus rotundifolia* Lam. l. c., the species correctly called *A. ovalis* Medicus but often known as *A. vulgaris* Moench or *A. rotundifolia* (Lam.) Dum.-Cours. Wiegand's figures for the height, 2–5 m. (or up to nearly 17 feet) and Rehder's statement that *A. spicata* is a tall and fastigiate shrub, already quoted, do not seem like Jones's "Low, surculose colonial shrubs 0.3–2 m. tall". Altogether the original account by Lamarck gives as little support to the recent misidentification of *A. stolonifera* et al. as *A. spicata* as does the photograph of the type.

Lamarck compared his *Crataegus spicata* only with the one European species, his *Crataegus rotundifolia*, the *Amelanchier ovalis* Medicus, but it was much taller and with larger leaves and fruit, the leaves of *C. rotundifolia* "petites en comparaison de celles des autres espèces". When we examine characteristic material of *A. ovalis* (our PLATE 1028), we note the leaves with outline much as in the type of *A. spicata*, with their veins similarly subapproximate; the sepals and petals erect; and the pedicels and hypanthium densely pilose (FIG. 2). It is difficult to escape the conclusion that *A. spicata* is closely related to the European *A. ovalis*. If it is desired, on account of its much greater height and fastigiate development, to consider it of hybrid origin, why not invoke *A. canadensis* (*oblongifolia*), as is done by Wiegand

[1] For detailed study of this identification and for photograph of the type of *Mespilus canadensis* see RHODORA, xliii. 560–563, plate 672, fig. 1 (1941).

Photo B. G. Schubert, after Alfred Rehder

Type, × 1, of Amelanchier spicata (Lam.) K. Koch (*Crataegus spicata* Lam.).

Photo B. G. Schubert

The European AMELANCHIER OVALIS: FIG. 1, flowering and fruiting branches, × 1; FIG. 2, portion of flowering raceme, × 5.

Photo B. G. Schubert

AMELANCHIER STOLONIFERA from TYPE-SERIES: FIG. 1, flowering branch, × 1; FIG. 2, portion, × 5, of raceme just past anthesis; FIGS. 3 and 4, lower and upper faces of mature leaves, × 1.

Photo B. G. Schubert

AMELANCHIER STOLONIFERA from TYPE-SERIES: FIG. 1, branch with half-grown fruit, × 1; FIG. 2, leaves of vegetative sprout, × 1.

and by Rehder (Man.), but without dragging in the very different *A. stolonifera*. In *A. canadensis*, which had long been cultivated in European gardens and which, like *A. spicata*, "on cultive au Jardin du Roi", the leaves are broadly rounded at summit, the young hypanthium densely pilose and the sepals soon erect or strongly ascending.

The insistence that *Amelanchier spicata* originated in America is based on rather unsatisfactory evidence. Lamarck did not assert that it came from Canada, but that "They pretend or claim that it is found in Canada" ("On prétend que cet arbrisseau se trouve au Canada"). That was a qualified statement, not a clear statement that it is Canadian. It seems more probable that it originated in the Jardin du Roi, possibly as a cross of *A. canadensis* and *A. ovalis*. It is time to exclude without quibble the name *A. spicata* (Lam.) K. Koch from North American treatments of *Amelanchier*.

Explanation of Plates 1027–1030

Plate 1027, Amelanchier spicata (Lam.) K. Koch, both figs. enlarged to × 1, from photograph of type of the basic *Crataegus spicata* Lam. (from negative taken by Professor *Alfred Rehder* and preserved in the Herbarium of the Arnold Arboretum): figs. showing vegetative leafy shoot with subapproximate lateral nerves, the blades broadly rounded to subtruncate, the calyx-teeth and petals strongly ascending.

Plate 1028, Amelanchier ovalis Medic.: fig. 1, flowering and fruiting branches, × 1, from Alsace, *Spach* (note broadly rounded to subtruncate leaves with subapproximate ribs; also erect calyx-lobes and petals); fig. 2, portion of flowering raceme, × 5, showing densely pilose pedicel and calyx; also erect calyx-teeth and petals.

Plate 1029, Amelanchier stolonifera Wiegand, all figs. from type: fig. 1, flowering stem, × 1, showing long smoothish pedicels and spreading calyx-teeth and petals; fig. 2, summit of raceme just past anthesis, × 5, showing glabrous pedicels and calyx and spreading calyx-teeth; figs. 3 and 4, lower and upper faces of mature (autumnal) leaves, showing remote ribs, × 1.

Plate 1030, Amelanchier stolonifera Wiegand, both figs. from type: fig. 1, stem with half-mature fruit, showing short-acuminate leaves, long glabrous pedicels and spreading calyx-teeth; fig. 2, leaves of vegetative sprout, showing distant ribs.

A Monograph of Amelanchier.—Perhaps no genus of the *Rosaceae* in North America, except of course *Rubus* and *Crataegus*, has offered so much of perplexity and has had such contradictory treatment as *Amelanchier*. Wiegand brought much light into the problem and established by his detailed studies, published from 1912 to 1921, the more important characters of growth-habit, flowers, fruit and foliage of the several eastern North American species. Wiegand, however, too much accepted traditional misidentifications and apparently did not always trace the older names to their actual types; his strength lay in his tireless field-observa-

tions and clarification of morphological characters. Most of the types have subsequently been checked and the names of several species, of which the morphological characters were accurately and painstakingly worked out by Wiegand, have, consequently, been readjusted. Now comes a beautifully printed and well illustrated monograph of 100 pages and 23 plates by Professor George Neville Jones[1]. Professor Jones dismisses at once the decision of Wiegand and very many others with extensive field-experience that hybridization occurs to any extent in *Amelanchier*, although he does actually admit the single hybrid, × *A. grandiflora* Rehder and in a note concedes a cross of *A. Bartramiana* and *A. canadensis*. His conclusion is based on cytological studies by others in the subfamily *Pomoideae*, Sax having reported, as quoted by Jones, "that the pure species of Amelanchier that he studied are diploids, but two natural interspecific hybrids are tetraploids" and Moffett having stated that "the chromosome number of the Pomoideae is a 'secondary basic number (unbalanced relative to the primary basic number) and the derived series of polyploids . . . are secondary polyploids'." Jones goes on: "It seems possible, therefore, that polyploidy may have played a more important part in the differentiation of genera and species in this subfamily than has heretofore been realized, since a change in chromosome balance is usually accompanied by a change in the morphological characters of the plant". Isn't it common knowledge that the vast number of strikingly different and fully appreciated apples and pears (such strikingly dissimilar apples as Baldwin, Gilliflower, Lady and Red Siberian, or such contrasted pears as Bartlett, Seckel and Beurre Bosc) are the result of hybridization? Ability to hybridize is the basis of pomology. If the *Pomoideae* did not freely lend themselves to crossing, apples and pears would be pretty poor food. Groups in which hybridization (therefore allopolyploidy) is rare or difficult to achieve are not horticultural successes! Professor Jones dismisses generally recognized hybridization in the *Pomoideae* because "polyploidy may have played a more important part"; but he does not seem to recognize the elementary fact that allopolyploidy is an accompaniment of hybridization! Witness the distinction between the two types of polyploidy as clearly indicated in Julian Huxley's "Evolution: the Modern Synthesis" (p. 334):

> Next we have the various phenomena of polyploidy in which a multiplication of whole genomes or chromosome-sets occur. As already mentioned, polyploidy is of two fundamentally distinct types: autopolyploidy in which the chromosome sets are all of the same kind, derived from the same species, and initial allopolyploidy, in which they are of different kind, derived from two distinct species. The actual doubling is in both cases due to the suppression of division of a cell after division of the chromosomes has taken place, but whereas this is the primary event in autopolyploidy, in allopolyploidy it is subsequent to hybridization.

The generally recognized hybrid of *A. Bartramiana* and *A. laevis*, which Dr. Jones evidently, from the citation of specimens, has known only as dried material collected by others, is treated as a full species, *A. neglecta* Eggleston, although the specimens loaned to Dr. Jones for study often have his validation as "× *A. neglecta*"! Most other hybrids, of which

[1] GEORGE NEVILLE JONES. American Species of Amelanchier. Illinois Biological Monographs, xx. no. 2. 100 pp. 23 plates. Univ. Ill. Press, Urbana, Ill. 1946. $1.50, paper-cover; $2.00, cloth-cover.

Wiegand had very many, are placed without reservation in single recognized species because, by the author's unique reasoning, they are polyploids.

A total of 18 species is admitted for the whole continent, an ultraconservative number which many, who have had more extended field-acquaintance with the shrubby members, will doubtless be inclined to augment. Pubescence (usually a pretty variable and too often a passing character) is largely relied upon, the first division of the eastern species depending on "Top of ovary glabrous" as opposed to "Top of ovary tomentose, usually densely so, rarely with only a few trichomes", while under the latter the eastern species are again divided on more or less persistence of pubescence. This may be the best that can be done, but it is unfortunate that so fluctuating a character as persistence of pubescnce has to be made fundamental. The characters of hypanthia, sepals, petals, styles, etc., used to separate species, seem more stable; and growth-habit, which is well understood by those who, like Wiegand, spent many seasons in studying the genus in the field over an extensive area, is really important.

Dr. Jones reproduces, most happily, photographs, so far as they were accessible to him, of types or isotypes, a large proportion of the originals borrowed from the Gray Herbarium. In two cases only tracings made by others and borrowed by him are given, as in plate XI, fig. 1, a tracing made by the late Benjamin L. Robinson and bearing in his hand the explanation, or in plate XVII, fig. 2, another tracing made by Dr. Robinson (with his characteristic handwriting nearly covering the sheet). These illustrations are invaluable.

In some cases, at least, the photographs of the types lead one to wonder at the identifications. For instance, plate XI, fig. 2, shows a small and not very clear photograph of *Crataegus spicata* Lam., basonym of *A. spicata* (Lam.) K. Koch, which Dr. Jones feels to be "clearly . . . the common and widespread small serviceberry of eastern North America": *A. humilis* Wiegand, *A. stolonifera* Wiegand and the more localized and southern *A. austromontana* Ashe. Whether those who have for many years known the stoloniferous and loosely colonial low *A. stolonifera* and *A. humilis* will be satisfied that the calcicolous inland *A. humilis* and the oxylophytic *A. stolonifera*, chiefly of the Atlantic slope, are identical is very doubtful; and it is extremely doubtful if anyone but Dr. Jones will be satisfied that either of these dwarf and colonial American shrubs is identical with the non-colonial, fastigiate and very tall *Crataegus spicata* of Lamarck. The latter, a shrub of unknown nativity, supposed or claimed to have come from Canada ("On prétend que cet arbrisseau se trouve au Canada"), was cultivated in Paris in 1783. Lamarck stated that his *C. spicata* strongly resembled the widespread European species, *Mespilus Amelanchier* L., which under *Amelanchier* is known as *A. ovalis* Medicus, *A. vulgaris* Moench or *A. rotundifolia* (Lam.) Dum.-Cours., the species which had been called by Lamarck *Crataegus rotundifolia*. Lamarck said that his *C. spicata* was two or three times taller ("Cet arbrisseau [*Crataegus spicata*] a beaucoup de rapport avec le précédent [*C. rotundifolia*], mais il s'élève deux ou trois fois davantage"). Since Lamarck's *C. rotundifolia* was 3–5 feet high ("la hauteur de trois à cinq pieds"), that would make *C. spicata* measure "about 2–5 m." (as pointed out by Wiegand who is quoted by me in the illustrated study of Lamarck's type on p. 125, with plate 1027 in this number of RHODORA) in

height. The North American *A. humilis* is consistently lower, 0.3–1.5 m. high ("3–12 dm.", Wiegand, and also Rosendahl & Butters, Trees and Shrubs Minn.; "4–15 dm.", Deam, Shrubs Ind.), while *A. stolonifera* (details shown in plates 1029 and 1030 in this number) is quite as low ("3–12 dm.", Wiegand). Dr. Jones, discussing the habit of species, says (p. 10): "Certain other species, e. g., *A. spicata*, are usually dwarf, but under exceptionally favorable conditions may reach a height of two meters". That still falls far short of the maximum of 5 meters implied by Lamarck for the cultivated type of *A. spicata;* and if, as Dr. Jones believes, the southern *A. austromontana* belongs to all-inclusive *A. spicata*, it is too bad that he restricted the height to "0.3–2 m.", for *A. austromontana* was originally described by Ashe as "not exceeding 4 m. in height" (a back-handed way of implying at least more than 2 m.). The photographs of types of *A. spicata*, *A. stolonifera*, *A. humilis* and *A. austromontana* are, fortunately, all shown by Dr. Jones and outlines of characteristic leaves are displayed separately. While the leaves of the type of *A. spicata* (see plate 1027 in the article preceding this review) are quite broadly rounded to subtruncate at summit, those of all three American types are of narrower and more elongate outline and more gently rounded or tapering to the short-tipped apex and the veins of *A. spicata* are relatively more approximate. The three Americans are closely akin; the type of *A. spicata* evidently an alien, with leaves closely matched in outline, toothing and venation by very many specimens of the European *A. ovalis* Medic. (*Mespilus Amelanchier* L.) (See plate 1028 in preceding article).

If, as would seem from the photograph of the type, *Crataegus spicata* Lam. is a variation or perhaps a hybrid of the European *Amelanchier ovalis*, then it would be distinguished from our shrubs by several characters, including, according to Rehder's Manual, "Styles free" in *A. ovalis* as opposed to "Styles connate at least at base" in the remainder of the species, this character sometimes considered to have such magic that it is relied upon as the final argument in keeping apart as genera *Pyrus* ("Styles free") and *Malus* ("Styles connate at base")[1]. If it be maintained that *Amelanchier spicata* is not a phase of or derivative from *A. ovalis*, it can, at least, not be satisfactorily identified with three or more lower and habitally very different American species.

Further differences from the interpretations of Wiegand and others, like the reduction outright to *A. sanguinea* (Pursh) DC. of *A. huronensis* and *A. amabilis* Wiegand, need not here be discussed. They at least show very strong departures in interpretation of characters.

Outline maps with dots indicate the ranges. These, it must be assumed, give a general picture of the range, and when such strongly contrasted areas as those of the western *A. pallida* (map 13) and of the eastern *A. Bartramiana* (map 1) are shown the contrast is striking. When, however, *A. stolonifera*, *humilis* and *austromontana* are merged (as *A. "spicata"*) one does not know how, from the map, to sort out the different elements which others recognize as true species. In some cases more attention to exact geography would have been desirable. For instance, map 2 is said to show the range of *A. neglecta*. It does in a general way, but since this shrub is not cited (or known) from the Magdalen Islands, it is at least disconcerting to see the outlines of that archipelago blackened out by a

[1] For an analysis of the reputed but sadly inconstant morphological characters separating *Malus* from *Pyrus* see RHODORA, xlv. 450 (1943).

round dot. From Nova Scotia a single collection is cited, from Meteghan, at the western end of the Province, but unsupported dots are shown all the way to northern Cape Breton, more than 500 miles northeast of the one recorded station at Meteghan. Again, the great Province of Quebec seems to have been as much of a puzzle to the map-maker as it was when, in his *Monograph of Symphoricarpos* in Journ. Arn. Arb. xxi. 216 (1940), he cited the type of *S. albus* as coming from "Quebec, Ontario, Canada". On the map of *A. neglecta* a single row of six equally spaced dots runs from the tip of the Gaspé Peninsula to the Richelieu River south of Montreal and no dot is shown north of the River St. Lawrence. Five stations are cited (instead of six): Gaspé Bay; Montmagny (more than 300 miles to the southwest); Montmorency Falls (a famous tourist-resort about 40 miles west of Montmagny and NORTH of the St. Lawrence); Lac Long (about 65 miles northwest of Montmorency and also NORTH of the St. Lawrence); and "Ottawa River" (hundreds of miles long and joining the St. Lawrence FROM THE NORTH). A mere outline of the general range might have suggested the main point; the failure carefully to consult an atlas would be less evident.

All in all the new monograph of *Amelanchier* is a very neat piece of presswork. Its illustrations of types are well reproduced and most helpful, the general ranges approximately shown (though slipping on unfamiliar territory), its descriptions detailed, the recent identifications by others of types of American species accepted (but the specific segregations and the hybrids of Wiegand not admitted) and the citations of specimens very full (though said to be incomplete). In the latter particular, with what Wiegand and many others have always considered quite separate elements here merged, it would have helped others if specimens of the different included elements could have been indicated by some sign. Where individual judgment so radically differs as in this "Monograph", especially through obviously unequal degrees of field-work and consequent understanding of the different characters and, likewise, through failure to recognize the well known fact that allopolyploids are hybrids, it would have helped, so long as the largest portion of the work is given over to very full listing of specimens, if the original identifications by Wiegand of his own species, for instance, had been noted. That would partly separate the different elements. Then the shrub which Wiegand and scores of other critical students (Butters, Deam, Fassett, Rehder, Rosendahl and many more) have considered *A. humilis* would not (when merged with the habitally similar *A. stolonifera* under the impossibly American and habitally very dissimilar *A. "spicata"*) appear to occur from Newfoundland to Georgia, where it is not found.

In the enumeration of numbered specimens (admittedly only a part of those seen) the author of the latest treatment of *Amelanchier* has the very modest score of 32, Wiegand of 85, a score which could and certainly should have been most profitably increased if Wiegand's authoritative series of 696 sheets left at Cornell University and his earlier authentic series of 63 sheets at Wellesley College—a total, with the 85 cited assumed to be duplicates, of more than 750 sheets, which largely formed the bases of Wiegand's detailed publications over ten years—had been consulted. Most surprisingly, however, there is no indication in the acknowledgments that the new author on *Amelanchier* was interested to see this great fundamental mass of authentic material. One other close field-student of the

genus over many years, one who understands the southeastern species, is credited with having participated in the collection of 183 cited numbers; another, who has closely watched the group in the field for half a century and who largely accompanied the painstaking Wiegand, with about 225. These are mere trivialities compared with Wiegand's record of more than 750 but impressive when compared with a total score of only 32. If these clear evidences of field-experience and intensive work on and understanding of the genus had been reversed, perhaps the results would be very different.—M. L. F.

THE VARIETIES OF LYCOPODIUM INUNDATUM.—The circumboreal *Lycopodium inundatum* L., if it had stayed in the cool-temperate areas of Eurasia, would present no troublesome problem. In North America, however, it is one of a series of species and varieties which extend, as a somewhat perplexing group, all the way from Newfoundland to the Tropics. By many authors it has been considered to be confluent with the coarse *L. alopecuroides* L. of the southeastern United States and the West Indies, a species characterized by its low-arching or recurved-procumbent stem rooting at the tip, its leaves linear- or narrowly lance-attenuate and with the similar sporophylls usually bristly-ciliate, the upright densely leafy fertile branches 0.5–1.5 cm. thick, the strobile 1–2.5 cm. thick, the spores with coarsely reticulate base and with the apical half covered with coarse papillae crowded into rows. Thus Hooker in his British Ferns (1861) wrote, under *L. inundatum*, pl. 51: "*L. Carolinianum* and *L. alopecuroides*, and not a few others, supposed species, must be added to this list, if we were to make the exotic synonymy complete"; then, to add to the bibliographic confusion, he cited as a synonym "LYCOPODIUM Bigelovii. *Oakes and Tuckerman in Sillim. Journ.*". The latter unverified reference Hooker obviously borrowed from Spring, Mon. Fam. Lycopod. pt. ii. 33 (1849), who had cited as a synonym of *L. inundatum* L.: "L. Bigelovii *Oakes et Tuckerm.*! *prius* (*ex Tuckerm. in Sill. Journ. of Nat. Hist.*)." Oakes and Tuckerman made no such binomial! Instead, Tuckerman in Am. Journ. Sci. and Arts (conducted by Professor Silliman and Benjamin Silliman, Jr.), xlv. 47 (1843) had under *L. inundatum* two varieties: "β. *Bigelovii*, (mihi): majus, ramis subramosis elongatis, foliis acuminatis sparsim denticulatis s. integris. *L. Carolinianum*, *Bigel. Fl. Bost. p.* 384.—γ. *alopecuroides*, (mihi): . . . *L. alopecuroides* L.",

etc. The significant point is that var. β. *Bigelovii*, based in part on *L. carolinianum* Bigel. Fl. Bost. ed. 2: 384 (1824), not L., Bigelow's plant with "peduncle . . . long, slender", coming from Cape Cod (Sandwich), was based by Tuckerman primarily on a collection from "Plymouth, Oakes and Tuckerman". Spring confused the collectors with the author and wrongly made them the authors of a species they did not describe; Hooker followed suit and in copying Tuckerman's synonymy, neglected to emphasize that he meant *L. carolinianum* sensu Bigelow, not L.

As pointed out by me in Rhodora, xxiii. 100 (1921), the type of *Lycopodium inundatum*, var. *Bigelovii*, the Oakes and Tuckerman plant from Plymouth, is inseparable from *L. adpressum* (Chapm.) Lloyd & Underwood or *L. Chapmani* Underwood, this well illustrated in Britton & Brown, Ill. Fl. ed. 2, i. fig. 104 (1913), their fig. 105, purporting to show *L. alopecuroides*, being made from a specimen of *L. inundatum*, as shown by the short creeping sterile branches, the slender fertile branch, and the ovate-based sparsely toothed sporophyll. In some later writings, as in Rhodora, xxxviii. 382 (1936), I lost the thread and confused two varieties, taking up again *L. inundatum*, var. *adpressum* Chapm. for what had earlier been described as var. *Bigelovii* and treating, incorrectly, as var. *Bigelovii* a coarser variety which had been described from southern New England and New Jersey as *L. inundatum*, var. *robustum* R. J. Eaton in Rhoroda, xxxiii. 202 (1931). As I now understand the three varieties of *L. inundatum* they may be defined as follows.

Leading creeping terminal shoot elongating from 1.5–10 (when submerged –15) cm. beyond the last of the 1 or 2 (very rarely 3) fertile branches; fertile branches 0.5–7 (rarely –10) cm. high; strobile 0.8–4 cm. long, 6–10 mm. thick, its ovate- or lanceolate-based bracts with loosely ascending to spreading tips; transcontinental northern plant. . *L. inundatum* (typical).

Leading creeping terminal shoot elongating from 0.7–4 dm. beyond the last of the mostly 2–10 fertile branches; the latter 0.5–4 dm. high; strobile (1.5–) 2–15 cm. long, its bracts with lanceolate bases; southeastern and eastern coastwise plants.

Fertile branches stiffly erect (flexuous only when drowned), 2–5 mm. thick, densely covered with loosely ascending to spreading leaves mostly 5–8 mm. long; strobiles 7–14 mm. thick at base, including tips of loosely ascending to spreading elongate (5–8 mm.) bracts; sporangia mostly hidden under the bracts. . . . . Var. *robustum*.

Fertile branches erect or flexuous, 1.5–3 mm. thick, more openly covered with appressed or ascending leaves 3–5

mm. long; strobile 3–7 mm. thick, with closely appressed or ascending shorter (3–6 mm.) bracts; outlines of sporangia (at least in dry specimens) often evident through the thin bracts.....Var. *Bigelovii.*

L. INUNDATUM L. Sp. Pl. 1102 (1753).—Damp peaty or sandy shores, swamps or bogs, Newfoundland to Alaska, south to Nova Scotia, New England, New Jersey, Pennsylvania, mountain-region to western Virginia and West Virginia, northern Ohio, northern Indiana, northern Illinois, Minnesota, Idaho and Oregon; Eurasia.

Var. ROBUSTUM R. J. Eaton in RHODORA, xxxiii. 202 (1931). Var. *Bigelovii* sensu Fernald in RHODORA, xxxviii. 382 (1936), not Tuckerman.—Eastern Massachusetts, south on or near coastal plain to Florida and Louisiana.

Var. ROBUSTUM, forma **furcatum** (Fernald), comb. nov. Var. *Bigelovii*, forma *furcatum* Fernald in RHODORA, xliv. 377 (1942).

Var. BIGELOVII Tuckerm. in Am. Journ. Sci. xlv. 47 (1843). *L. carolinianum* sensu Bigelow, Fl. Bost. ed. 2: 384 (1824), not L. (1753). Var. *appressum* Chapm. in Bot. Gaz. iii. 20 (1878), altered to Var. *adpressum* Chapm. Fl. So. U. S. ed. 2: 671 (1883). *L. alopecuroides*, var. *adpressum* (Chapm.) Chapm., Fl. So. U. S. ed. 3: 638 (1897). *L. adpressum* (Chapm.) Lloyd & Underwood in Bull. Torr. Bot. Cl. xxvii. 153 (1900). *L. Chapmani* Underwood in Maxon in Proc. U. S. Nat. Mus. xxiii. 646 (1901). *L. alopecuroides*, ssp. *adpressum* (Chapm.) Clute, Fern Allies, 118, pl. 5 (1905). *L. alopecuroides*, forma *adpressum* (Chapm.) Clute in Fern. Bull. xvii. 48 (1909).—Florida to eastern Texas, north on or near coastal plain to southeastern New Hampshire and Nova Scotia, where freely passing into typical *L. inundatum.*

Var. BIGELOVII, forma **polyclavatum** (McDonald), comb. nov. *L. adpressum*, f. *polyclavatum* McDonald in Fern Bull. ix. 9 (1901). *L. alopecuroides*, var. *adpressum*, f. *polyclavatum* (McDonald) Clute in Fern Bull. xvii. 45 (1909). *L. inundatum*, var. *adpressum*, f. *polyclavatum* (McDonald) Fernald in RHODORA, xlii. 405 (1940).—M. L. FERNALD.

NEW COMBINATION IN CHRYSOBALANUS.—As a preliminary to issuing the next century of the Plantae Exsiccatae Grayanae it becomes necessary to make the following new combination:

CHRYSOBALANUS **pallidus** (Small), comb. nov. *Geobalanus pallidus* Small, Fl. Miami, 81, 200 (1913).—LYMAN B. SMITH, Gray Herbarium.

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CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXII.

IDENTIFICATIONS AND REIDENTIFICATIONS OF NORTH AMERICAN PLANTS

M. L. Fernald

(Plates 1031–1050)[1]

During a somewhat searching study of different groups in the flora of eastern North America it is found imperative, if we are properly to identify our plants, to study the original descriptions and their citations and, when possible, to see the types or good photographs of the types. Otherwise, as in too many cases, we make wrong guesses and encumber taxonomy with erroneous and quite misleading names. In some of the present series of studies attempts have been made to place the names of the plants studied on a surer basis than heretofore.

The Identity of Quercus laurifolia (plates 1031–1036). *Quercus laurifolia* Michx. Hist. Chênes Am. Sept. tt. xvii. and xviii (1801), has so long been misinterpreted, at least since Elliott in 1824, that it becomes necessary to study in some detail the original material of Michaux and the two species which have figured in the misinterpretation of his clearly defined and beautifully illustrated species.

[1] The cost of preparing and engraving the plates met in part through grants from the American Philosophical Society and from the Department of Biology of Harvard University.

The two principal elements involved in the problem are (1) *Q. hemisphaerica* Bartram as validated by Willd. Sp. Pl. iv[1]. 443 (1805), the southern tree (our PLATES 1035 and 1036) with full hemispherical or subspherical head; the coriaceous, dense and opaque, evergreen or only tardily deciduous (at least overwintering) leaves, with foliage of the fruiting branches oblong-lanceolate or -oblanceolate to narrowly elliptic or oblong, quite glabrous on both lustrous surfaces, cuneate at base, either acute or obtuse, 3–10 cm. long and 1–3 cm. broad, very short-petioled; leaves of vigorous vegetative sprouts often sinuate-dentate or -serrate; cup shallowly saucer-shaped, 1–1.5 cm. broad and 3–5 mm. high, with strongly flattened-rounded base; the nut 0.8–1.5 cm. long; the tree occurring on the outer coastal plain from Florida to eastern Texas, north to southeastern Virginia; and (2) the tree with longer, broader and thinner leaves membranaceous and showing, by transmitted light, a clear and intricate reticulation, the glabrate lower surface often with tufts of pubescence in the axils of the lateral veins; the cup deeply saucer-shaped, shallowly cup-shaped or turbinate, 1.5–2 cm. broad and 7–10 mm. high; this being the species described in detail by Sargent as his *Q. rhombica* Sargent in Bot. Gaz. lxv. 430 (May 15, 1918), our PLATES 1031 to 1033, with "Leaves rhombic, rarely oblong-obovate to lanceolate, acute or rounded . . . at apex, cuneate at base, . . . at maturity thin, . . . 9–12 cm. long and 3.5–5 cm. wide, with . . . slender primary forked veins; . . . falling gradually in early winter; . . . cup saucer-shaped to cup-shaped . . . From *Q. laurifolia* it differs in the shape of its thinner leaves . . . and in its larger fruit with much deeper cups". As a variety Sargent described material from a single tree, his var. *obovatifolia* (our PLATE 1034) which differed "in the obovate leaves at the ends of the branches, rounded or slightly 3–lobed or undulate at the broad apex".

On a succeeding page (432) Sargent discussed what he took to be true *Quercus laurifolia* Michx., with "leaves, which are thicker than those of *Q. Phellos* L., are dark green, very lustrous, and glabrous . . . usually not more than 7–8 cm. in length;" and (p. 433) saying "The laurel oak is not evergreen. Late in the winter the leaves begin gradually to turn yellow and then brown, and when the buds begin to swell at the appearance of spring

Photo B. G. Schubert

QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, foliage and fruit, × 1, after *Michaux;* FIG. 3, fruit of *Q. rhombica* Sargent, after *Sargent;* FIG. 4, leaf, × 1, of *Q. laurifolia*, var. *hybrida* Michx. or var. *obtusa* Willd., after *Michaux.*

Photo B. G. Schubert

QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, fruiting branch and terminal leaves, × 1, from Virginia; FIG. 3, leaves, × 1, of PARATYPE of *Q. rhombica* Sargent.

drop almost simultaneously". Later, in his Man. Trees N. Am. ed. 2: 261 (1922) the "much deeper cup" "saucer-shaped or cup-shaped" of *Q. rhombica* became merely "a saucer-shaped cup", although the artist saw it and represented it (our PLATE 1031, FIG. 3) as definitely turbinate and half as high as broad. In this edition of Sargent's Manual the earlier and inclusive description of *Q. laurifolia* was not sufficiently altered to bring out all the contrasts between the two species as conceived by Sargent, for the "thicker" leaves were here described as "at maturity thin", although the cup of the species with narrow coriaceous and over-wintering leaves was correctly illustrated and described as "a thin saucer-shaped cup".

In his original discussion of *Quercus laurifolia* in his sense (i. e. *Q. hemisphaerica*), with leaves "usually not more than 7–8 cm. long" and, as stated in his Manual, "¾′ [*i. e.* 1.8 cm.] wide", Sargent commented on the plates which Michaux published with the original description of *Q. laurifolia:* "On the branches figured by MICHAUX the leaves are generally elliptic but sometimes slightly broadest above the middle, acuminate at the ends [in Michaux's var. *hybrida* (our PLATE 1031, FIG. 4) "obovate and rounded at apex"], and 6–12.5 cm. in length". Furthermore, Michaux's plate (our PLATE 1031, FIGS. 1 and 2) showed, in case of typical *Q. laurifolia*, a fruiting branch with leaves mostly 2–4 cm. broad, and a photograph in the Gray Herbarium of his type of the typical form shows very thin and translucent foliage (PLATE 1033, FIG. 1), the intricate reticulate venation too strongly suggesting that shown by transmitted light in leaves of the type of *Q. rhombica* (PLATE 1033, FIG. 3). Instead of being unusual the leaves shown by Michaux of his original *Q. laurifolia* and its var. *hybrida* seem to me inseparable from those of thoroughly characteristic *Q. rhombica*, originally described with leaves "9–12 cm. long and 3.5–5 cm. wide, with stout conspicuously yellow midribs and slender primary forked veins"; and the type of the acute-leaved form (var. *acuta* Willd.) preserved at Paris could easily have come from material of the tree illustrated by Michaux. Still further, Michaux described the "cupule un peu turbinée" and illustrated it (our PLATE 1031, FIG. 2) as pretty definitely so, just as in his Manual (our FIG. 3) Sargent had so illustrated the cup of *Q. rhombica.*

It is most difficult for me to believe that, when Michaux described and illustrated as his new *Quercus laurifolia*, with evidently thinnish leaves (the type showing intricate venation even in the photograph) on a fruiting branch, the blades up to 12.5 cm. long and 2–4 cm. broad, many of them in outline (as well as size) quite like those of *Q. rhombica*, the cup definitely turbinate and shown as half as high as broad, the tree with these characters having the thin leaves often with tufts of hair persisting beneath in the axils of the veins,—it is most difficult to follow Sargent in believing that Michaux was wholly mistaken and really intended to describe a tree with much shorter and narrower, dense, coriaceous, overwintering, glabrous leaves and "thin saucer-shaped" cups. I see no way but to treat *Q. rhombica* as typical *Q. laurifolia*.

One week before the publication of *Quercus rhombica*, Ashe picked up the *Q. laurifolia* β. *obtusa* of Willdenow, Sp. iv[1]. 428 (1805), a substitute preferred by Willdenow for *Q. laurifolia hybrida* Michx., and made the specific combination *Q. obtusa* (Willd.) Ashe in Torreya, xviii. 72 (May 8, 1918), thus antedating *Q. rhombica* of May 15, 1918. Ashe, like Sargent and others, took as *Q. laurifolia* the species which Willdenow had properly defined in 1805 as *Q. hemisphaerica*, for Ashe said of his *Q. obtusa:* "This tree is undoubtedly closely related to *Q. laurifolia* as generally understood, but it can be readily separated from it by the leaves of vigorous shoots, which in *Q. laurifolia* are irregularly toothed, while in *Q. obtusa* the margins are entire. The cup also has a very pointed base, while the base of the cup in *Q. laurifolia* is flat." Had Ashe looked at Michaux's plate of the original *Q. laurifolia* (our PLATE 1031, FIGS. 1 and 2) he would have seen quite entire leaves and a cup with "a very pointed base", not at all "flat". He could also have seen that Michaux's diagnosis clearly said "Cupula subturbinata".

Somewhat later, Ashe, realizing that *Quercus rhombica* of May 15 was *Q. obtusa* of May 8, published a note in RHODORA, xxiv. 78 (1922), making the reduction, still apparently not knowing that *Q. obtusa* and *Q. rhombica* were phases of true *Q. laurifolia*. He then picked up Sargent's very unsatisfactory *Q. rhombica*, var. *obovatifolia* and made the combination *Q. obtusa obovatifolia* (Sarg.) Ashe, this variety, according to him, differing

"only in its spatulate leaves with rounded apices." Sargent had said "obovate leaves at the ends of the branches, rounded or slightly 3-lobed or undulate at the broad apex", his type (our PLATE 1034) and only cited material being from "A single tree" from Beaumont, Texas, *E. J. Palmer*, no. 12747; Sargent accidentally omitting the last figure and adding: "The terminal leaves of this variety, . . . show a relationship with *Q. nigra* L.". They certainly do.

The more significant bibliography of *Q. laurifolia* is as follows:

Q. LAURIFOLIA Michx. Hist. Chênes Am. Sept. t. xvii (1801) and Fl. Bor.-Am. ii. 197 (1803). *Q. laurifolia hybrida* Michx. Hist. Chênes Am. Sept. t. xviii (1801). *Q. laurifolia* α. *acuta* and β. *obtusa* Willd. Sp. Pl. iv[1]. 428 (1805). *Q. laurina* Raf. Alsog. Am. 27 (1838), not Humb. & Bonpl. (1809). *Q. laurifolia* β. *obtusa* Pursh, Fl. Am. Sept. ii. 627 (1814). *Q. Phellos*, var. *laurifolia* (Michx.) Chapm. Fl. So. U. S. 420 (1860). *Q. aquatica* β. *laurifolia* (Michx.) A. DC. in DC. Prodr. xvi[2]. 68 (1864), in part. *Q. hybrida* (Michx.) Ashe in Proc. Soc. Am. For. xl. 88 (1916), not (Chapm.) Small (1903). *Q. obtusa* (Willd.) Ashe in Torreya, xviii. 72 (May 8, 1918). *Q. rhombica* Sargent in Bot. Gaz. lxv. 430 (May 15, 1918).—Florida to eastern Texas, north on coastal plain to Cape May, New Jersey.

My reason for including as separate names in the above synonymy both *Quercus laurifolia* β. *obtusa* Willd. (1805) and *Q. laurifolia* β. *obtusa* Pursh (1814) is, that Pursh did not cite Willdenow as the author of his variety. From the start this name has been the source of bibliographic or nomenclatural errors which make one blush for the performances of taxonomists of renown. In his Report on Forests of North America, 152 (1884) Sargent gave in his synonymy of *Q. laurifolia* "*Q. obtusa* Pursh, Fl. Am. Sept. ii. 627". This unintentional new binomial, which Pursh had not made, promptly appeared, correctly in this instance, in *Index Kewensis* under *Quercus* as "*obtusa*, Sargent . . . in syn".; and "*Quercus obtusa* Pursh" appears, as if made by Pursh, in Sudworth's Nomenclature of the Arborescent Flora of the United States (1897), in Trelease's writings and elsewhere, where some sort of verification might have been expected. Since the original *Q. laurifolia* var. *hybrida* Michx. (1801) was the sole basis of *Q. laurifolia* β. *obtusa* Willdenow (1805), the intricate and not very intelligent confusion of the two names must, unhappily, be investigated.

In Small, Fl. S. U. Se. 350 (1903), something quite different and based on *Quercus aquatica* Walt., var. *hybrida* Chapman, Fl. So. U. S. 421 (1860), this having nothing to do with *Q. laurifolia*, var. *hybrida* of Michaux, appeared as *Q. hybrida* (Chapm.) Small, although Small, with his customary "lack of time", left others to hunt up the place of publication of the basonym. Now *Q. aquatica* of Chapman's time was what has proved to be *Q. nigra* L. (1753) and his var. *hybrida* was evidently a form of it, with "leaves oblong or wedge-oblong, entire, emarginate, or 3-lobed at the summit", etc., surely having nothing to do with *Q. laurifolia hybrida* Michx. (our PLATE 1031, FIG. 4). Nevertheless, having subsequently decided that his *Q. hybrida* (Chapm.) Small was not worth maintaining, Small dropped it; but, under the already much discussed and nonexistent *Q. "obtusa* (Willd.) Pursh", he gave a single synonym, "*Q. hybrida* (Michx.) Small", Man. Se. U. S. 428 (1933), thus making still another useless binomial, this one invalid because published in synonymy! But when he published his *Q. hybrida* (Chapm.) Small in 1903, the author was not retarded because of the identical binomial (*Q. hybrida*) already published four times before, by Brotero in 1804, by Bechstein in 1843, by Hampton in 1886 and by Houba in 1887. As described by Chapman the basic name seems to have belonged to a tree very unlike the latter; but, as illustrated by Britton & Shafer, N. Am. Trees, fig. 254 (1908), its leaves and their venation are those of *Q. laurifolia*, the cup that of *Q. hemisphaerica*. Probably *Q. hybrida* (Chapm.) Small was an appropriate name.

In his monumental Histoire des Chênes de l'Amérique Septentrionale (1801) Michaux showed as *Quercus aquatica* the species now known to be *Q. nigra* L. in plates xix–xxi. Plate xx showed several different leaves, not all of them belonging to *Q. nigra* (*aquatica*) as now understood. Fig. 2 (our PLATE 1035, FIG. 1), especially, was a vigorous young shoot of an unnamed variety with the narrow leaves cut as in those of sprouts of *Q. hemisphaerica*. In a special paragraph at the end of his discussion of *Q. aquatica* Michaux commented on such foliage, saying:

> On trouve sur les dunes sablonneuses en Géorgie et en Floride, une variété de cet arbre à feuilles étroites, dentées irrégulièrement, et qui conserve ses feuilles pendant tout l'hiver. C'est probablement cette variété que BARTRAM a nommée QUERCUS *dentata* (*narrow leaved winter*

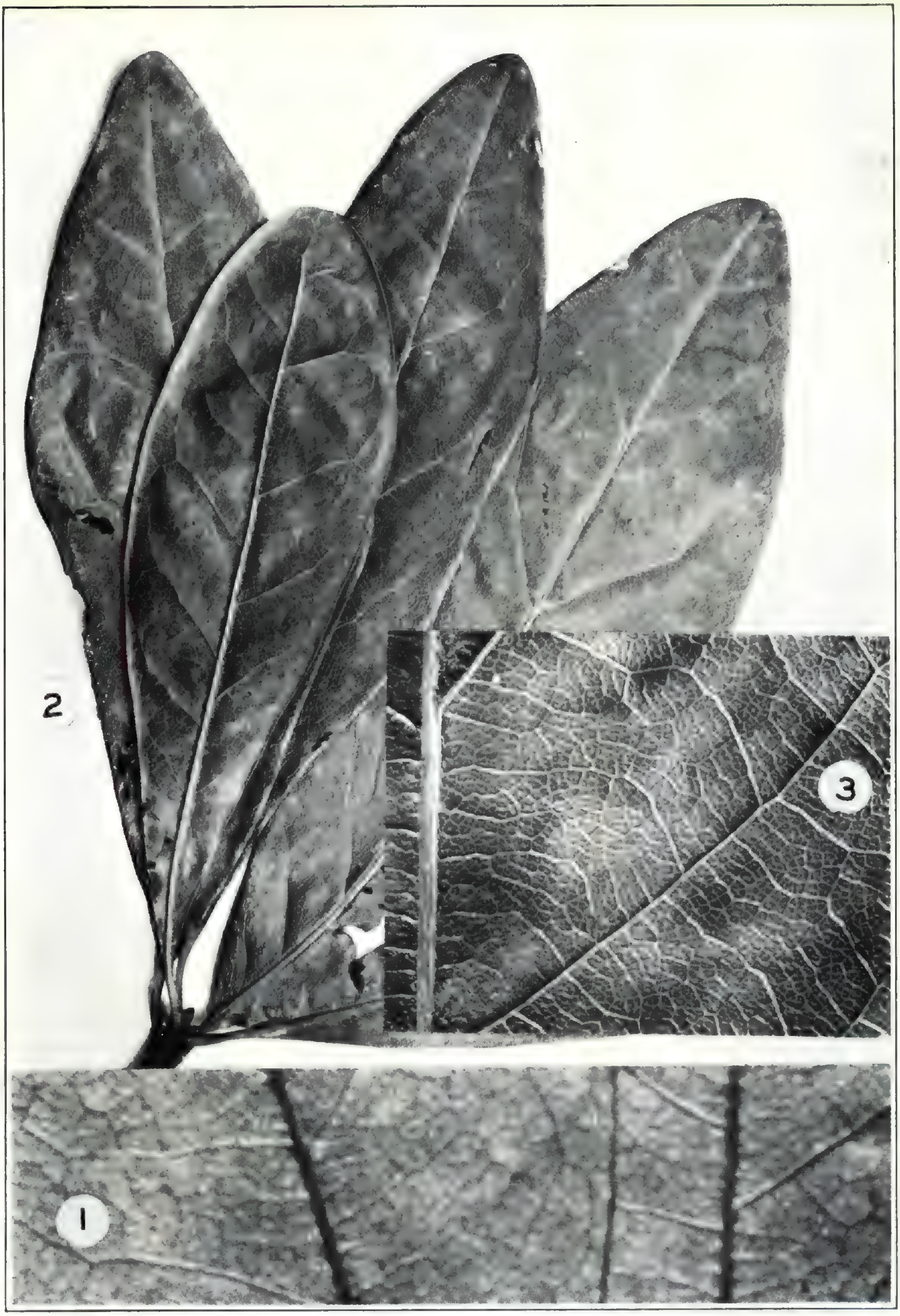

Photo B. G. Schubert

QUERCUS LAURIFOLIA Michx.: FIG. 1, venation of lower leaf-surface, × 3, from photograph of the TYPE by *Cintract;* FIG. 2, foliage, × 1, of type of *Q. rhombica* Sargent; FIG. 3, venation of lower surface of leaf of the latter, × 3.

Photo B. G. Schubert

QUERCUS LAURIFOLIA: portions, × 1, of type of *Q. rhombica*, var. *obovatifolia* Sargent.

green oak), et dans un autre endroit, QUERCUS *dentata s. hemisphoerica.* On doit la rapporter à notre Chêne aquatique. *Voyez* BARTRAM *Travels, p.* 14, 28 *et* 320.

Referring to Bartram, p. 14, one finds an account of "Our turkey of America" and nothing about any oak; but on p. 24 (probably intended by Michaux) there is a list of the trees and shrubs "growing on the banks of this sequestered river" which includes the undefined name *Q. dentata.* Page 28 yields, as growing near Savannah, "5. Q. dentata", which in a footnote is explained as "5. Narrow-leaved Wintergreen Oak"; and on p. 320 a long list includes "Quer. dentata, s. hemispherica". The last entry, *Quercus dentata* or *hemispherica,* makes the names alternative and therefore illegitimate, even if they had been accompanied by diagnoses, which they lacked. *Index Kewensis* solved the identity of these two alternative names by stating that one "= aquatica", the other "= nigra". This is one way out of the problem. The usually very cautious Stephen Elliott included in his Sk. Bot. S. C. and Ga. ii. 596 (1824), under *Q. laurifolia* the tree which Willdenow had properly validated as *Q. hemisphaerica,* with "Leaves nearly perennial, sessile, oblong-lanceolate, nearly acute, tapering at base, entire, glabrous on both surfaces"; and he cited in the synonymy *Q. hemispherica* Bartram, and in addition to Michaux's two plates of true *Q. laurifolia* "perhaps also t. 20. f. 2". His more detailed account of the tree with "a large handsome hemispherical head" with leaves "very glabrous on both surfaces . . . , those of the young plant toothed and irregularly sinuate. . . . *Cup* shallow, nearly sessile", was of *Q. hemisphaerica,* rather than of Michaux's *Q. laurifolia.* It is probable that Elliott's misidentification in 1824 set the standard by which later authors have misidentified *Q. laurifolia* of Michaux. Elliott's further remarks are illuminating:

> The figure in Mich. Querc. t. 20. f. 2. exactly resembles the young plants of this species. And as this oak, though growing in dry soils, is more known by the name of "Water Oak," than by any other appellation, it is not impossible that Michaux may have been misled by its popular denomination to insert a figure of it among the real Water Oaks.
>
> I have always considered this as the real Q. Hemisphaerica of Bartram. It certainly is the species to which his [*i. e.* Willdenow's] description most appropriately applies.
>
> Grows in rich sandy soils along the margin of swamps, appearing to take the place of the live oak as you leave the margin of the ocean, but growing also with the live oak on the sea-islands.

I realize that by *Index Kewensis* and by Sargent, Silva, viii. 165 (1895) *Q. hemisphaerica* is reduced, without a word of explanation, to *Q. nigra* L. To be sure, Trelease in his American Oaks, Mem. Nat. Acad. Sci. xx. 160 (1924), speaking of Willdenow's herbarium, said "forms occur as representatives of *Q. hemisphaerica* as he meant to use that name", but that these are the heterophyllous sprouts of several species. Willdenow may have had mixed material (and probably did, just as did Linnaeus for many species) but his diagnosis, "Q. foliis perennantibus oblongo-lanceolatis indivisis trilobis sinuatisque lobis mucronatis utrinque glabris. W.", and his basing of the species on Michaux's interpretation above quoted and Michaux's t. 20, fig. 2, leave no doubt as to what he primarily meant. Trelease's suggestion that *Q. hemisphaerica* might have been sprouts of *Q. nigra* or of *Q. Phellos* does not dispose of Willdenow's definite "foliis perennantibus" nor of the Michaux figure, for both *Q. nigra* and *Q. Phellos* have promptly deciduous leaves.

Sargent and, after him, Trelease, also cite in the synonymy of *Quercus nigra* "*Quercus hemisphaerica*, var. *nana*, Nuttall, Gen. ii. 214 (1818)", although Nuttall had no such variety under *Q. hemisphaerica*. Instead, this is what he said: "11. *hemispherica*, Bartram. Willd. also *Q. aquatica*, Willd. β. *nana*, *Q. nana*, Willd.". Willdenow having published as a species *Q. nana*, Nuttall's *Q. aquatica*, var. *nana* was a new combination (but not under *Q. hemisphaerica*). If we do not take up *Q. hemisphaerica* Bartram ex Willd. for the evergreen or partly evergreen species of the outer Coastal Plain of the South, we must coin a new name. Whoever does that will have some difficulty in demonstrating that André Michaux in 1801, Willdenow in 1805 and Elliott in 1824 were all wrong. There has been trouble enough; no good can come from making more. One whole precious week has been lost in working out these unedifying details. That is enough.

Professor W. C. Coker in Journ. Elisha Mitchell Sci. Soc. xxxii. plates 2–4 (1916) shows some beautiful illustrations of *Quercus hemisphaerica* (as the traditional "*laurifolia*"). The name *hemisphaerica*, when applied to these photographs, seems not to need the restrictive first two syllables. In the trade this tree has become known as "Darlington Oak", because of its early introduction as an evergreen ornamental to the streets of

Darlington, South Carolina. Professor Coker's account of the persistence of the foliage of "one of the handsomest and most ornamental oaks to be found in any country" should be repeated:

> One of the most remarkable qualities of the Laurel Oak is its habit of holding its leaves through the entire year throughout most of its range. Towards its northern limit and when planted outside of the coastal plain this habit is modified to a varying degree, depending on the climate. In the low country of South Carolina and along the gulf to New Orleans the tree is nearly or completely evergreen, but at Darlington and Hartsville, S. C., the leaves fall slowly through the winter, usually beginning at the tips of the branches and proceeding inwards, so that by February or March only the center remains decidedly green, with scattered green leaves in the peripheral parts.—Coker, l. c. 40.

Back to Carex rostrata.—In Rhodora, xliv. 324–331, plates 715 and 716 (1942) I felt it necessary, in following strict priority, to abandon the long-familiar name *Carex rostrata* Stokes (1787) for the earlier *C. inflata* Hudson (1762 in part, emend. 1778). This most unfortunate change of name for one of the most common and generally known *Carices* of cool-temperate regions around the northern hemisphere was induced by the decision of the late A. B. Rendle and James Britten in 1907, that the change was unavoidable. The decision of these usually quite accurate gentlemen, neither of whom understood *Carex*, was further argued and accepted by those most careful students of nomenclature, Schinz & Thellung (1908) and Mansfeld (1938), as well as the less cautious Druce and many others in Europe. There seemed no escape from *C. inflata*.

Now, however, the most accurate of recent British students of *Carex*, Mr. E. Nelmes of Kew, has given a very detailed analysis of Hudson's *C. inflata* in Journ. Bot. lxxx. 109–112 (1942), Hudson's original *C. inflata* of 1762 having been a sad mixture, clarified by his redefinition of it as a single specific element in 1778. Approaching the problem with full understanding of British *Carices*, Nelmes considers every possibility and, most happily, concludes: "From the available evidence it seems to me that *Carex inflata* Huds., *Fl. Angl.*, ed. 1, cannot be identified with any one species: it may be *C. vesicaria* L., or, less likely, *C. rostrata* Stokes, or, least likely, *C. laevigata* Sm.; but it is most likely to represent a mixture. *Carex inflata* Huds., *Fl. Angl.*, ed.

2, is almost certainly *C. laevigata* Sm.". Everyone who knows *Carex* will give a sigh of relief. The four varieties recognized by me and illustrated in 1942 should now be called

Carex rostrata Stokes in Withering, Brit. Pl. ed. 2, ii. 1059 (1787). *C. ampullacea* Gooden. in Trans. Linn. Soc. ii. 207 (1794). *C. inflata* sensu Rendle & Britten in Journ. Bot. xlv. 444 (1907), not Hudson, Fl. Angl. 354 (1762), emend. ed. 2: 412 (1778).

Var. **anticostensis** (Fernald), comb. nov. *C. inflata*, var. *anticostensis* Fernald in Rhodora, xliv. 329, pl. 715, figs. 5 and 6 (1942).

Var. utriculata (Boott) Bailey in Proc. Am. Acad. xxii. 67 (1886). *C. utriculata* Boott in Hook. Fl. Bor.-Am. ii. 221 (1839). *C. utriculata*, var. *minor* Boott, l. c. (1839); and many other synonyms cited by me in Rhodora, xlvi. 330 (1942), these including *C. inflata*, var. *utriculata* (Boott) Druce in Bot. Soc. & Exchange Club Brit. Isl. Rep. ix. 141 (1930).

Var. ambigens Fernald in Rhodora, iii. 51 (1901). *C. inflata*, var. *ambigens* (Fernald) Fernald l. c. xliv. 330, pl. 715, figs. 7 and 8 (1942).

Lemna valdiviana, not L. cyclostasa.—Although in his *Revision of the North American Lemnaceae*, printed in advance, Nov. 1, 1897, from the Ninth Ann. Rep. Mo. Bot. Gard. (1898), Dr. C. H. Thompson took up the name *Lemna cyclostasa* for one of the most distinct members of the genus, the authors of Gray, Man. ed. 7 (1908), rejected that name in favor of the validly published *L. valdiviana* Philippi (1864). Had Thompson refrained from precipitate haste to get out his Revision "in Advance" and verified his bibliography it would have been well; for, even now, some authors of volumes on aquatics, in spite of the correction made in ed. 7 of the Manual, still use the name *L. cyclostasa*. Thompson's bibliography was as follows:

> Lemna cyclostasa (Ell.) Chev. Fl. Par. **2:** 256. 1827. Schleid. Linnaea. **13:** 390. 1839. *Lemna minor* var.? *Cyclostasa* Elliott, Bot. S. Carol. and Ga. **2:** 518. 1824. *L. Valdiviana* Ph. Linnaea. **33:** 239. 1864. *L. Torreyi* Aust. in Gray, Man. Bot. 479. 1867. [5th ed.]. *L. abbreviata* Hglm. Engler's bot. Jahrb. **21**[3]**:** 298. Jan. 1895.

Had Thompson been less content with the lax and unverified type of bibliography which characterizes so much of the work of his sponsor, Trelease, he would have searched in vain in Chevalier's Flore générale des Environs de Paris for any mention what-

Photo B. G. Schubert

QUERCUS HEMISPHAERICA Bartram ex Willd., both figs. × 1: FIG. 1, the original figure of Michaux, cited by Willdenow; FIG. 2, leaves of young tree of *Q. laurifolia* sensu most authors, not Michaux, from Florida

Photo B. G. Schubert

QUERCUS HEMISPHAERICA, both figs. × 1: FIG. 1, fruiting branch from Georgia of *Q. laurifolia* sensu most authors, not Michx.; FIG. 2, cups and acorn from Florida.

ever of *L. cyclostasa*, a species unknown in Europe. Chevalier had the regular European *L. trisulca*, *polyrrhiza*, *arhiza*, *minor* and *gibba* but not *L. cyclostasa* of tropical and warm-temperate America. Had he looked at Schleiden's Monograph of Lemnaceae in Linnaea, xiii. 390 (1839) he would have found under *L. minor* the synonym "L. cyclostasa Elliot". Elliott had no such species but he did describe *L. minor*, var. *? cyclostasa;* Schleiden incorrectly attributed the binomial to him but, since the binomial was published in synonymy, it is invalid. Presumably Thompson copied his references directly from *Index Kewensis*, which gives "cyclostasa, Ell. ex Chev. Fl. Par. ii. 256; Schleid, in Linnaea, viii. (1839) 390=minor". But everyone with much experience knows that the earlier volumes of *Index Kewensis* must be taken as very untrustworthy guides. If anyone can find *L. cyclostasa* in Chevalier, he will make a clarifying discovery; but the reduction by *Index Kewensis* of the species to *L. minor* shows equal lack of understanding. As to Thompson's reference to *L. abbreviata* Hegelm., consultation of his *Systematische Übersicht der Lemnaceen* in Engler's Jahrb. (1895) immediately shows that Hegelmaier was not treating it as a species. Unfortunately, Hegelmaier adopted a misleading method of designating his varieties, by enclosing the specific name and "var." in parentheses, just as in this country there are always some nonconformists, who refuse to follow conventional practices. Hegelmaier gave numbers to all recognized species, "8. **Lemna angolensis** Welw.", "9. **Lemna valdiviana** Philippi", "10. **Lemna minima** Phil.", but under, 9. *L. valdiviana*, he had, without numbers "**Lemna** (**valdiviana** var.) **abbreviata**" and "**Lemna** (**valdiviana** var.?) **platyclados**". *L. valdiviana*, var. *abbreviata* was not intended as a species.

It has seemed important to dissect this case, in view of the faith trustingly reposed in "the books" by those who follow the uncritical American principle of accepting anything they see in print—a method not creditable when extended, as it so regularly is, into scientific bibliography. LEMNA VALDIVIANA Philippi has right-of-way until it is demonstrated that it is antedated by a validly published binomial.

Stenanthium in the Eastern United States (Plates 1037–1041).—

Stenanthium gramineum (Ker) Morong, var. **robustum** (S. Watson), stat. nov. *S. robustum* S. Watson in Proc. Am. Acad. xiv. 278 (1879). Plates 1039 and 1040.

S. gramineum, var. **micranthum,** var. nov. (tab. 1041), caule 0.25–1 m. alto, basin versus 1.5–5 mm. diametro; foliis subrigidis corrugatis 0.4–1 cm. latis; perianthiis 3–4.5 (–5) mm. longis.—Upland woods, western Virginia and eastern Tennessee to northwestern Florida and Alabama. Type from open woods, Caesar's Head, South Carolina, July 28, 1881, *John Donnell Smith* (Herb. Gray.).

The so-called specific distinctions between *Stenanthium gramineum* and *S. robustum* have proved to be very evasive, Britton in Britton & Brown, Ill. Fl. ed. 2: i. 489 (1913) giving seemingly good differences, his key reading:

"Leaves 2″–3″ wide; capsule reflexed.....1. *S. gramineum.*
Leaves 3″–10″ wide; capsule erect.....2. *S. robustum.*"

In the illustrations, however, these characters are not very definitely shown, the figures showing flowering pedicels spreading in both and no contrast in flowers or fruit, while the comment under *S. robustum* implies lack of full conviction: "Apparently distinct from the preceding species, though closely related". Small, Man. 277 (1933), gives a key which *looks* good:

"Perianth white: capsule deflexed, about 8 mm. long.....1. *S. gramineum.*
Perianth green: capsule erect, fully 10 mm. long.....2. *S. robustum.*"

In both cases the ranges are given as very extensive, *S. robustum* said by Small to grow in "Acid swamps, various provinces, S[outhern] S[tates] to Ark., Ohio, and Pa.".

When, however, the material of the *Stenanthium* of the eastern United States is even casually studied the keys are found not to unlock the door. The type of *S. gramineum* is *Helonias graminea* Ker in Curtis's Bot. Mag. xxxix. t. 1599 (Nov. 1, 1813), Ker there describing the "*flowers* small, . . . white, suffused with purple on the outside", and very many specimens, otherwise quite like Ker's plate, have the perianth green or bronze to purplish, as well as whitish. Furthermore, Watson's original description of *S. robustum* clearly said "perianth-segments 3 or 4 lines long, white or green". As to the "erect" capsules of the

latter, as opposed to "capsule deflexed" in the former, it is not reassuring to one's confidence in the character, to examine a series of *S. robustum* and then one of the usually smaller-flowered *S. gramineum*. Watson seems to have picked out to constitute his *S. robustum* stout and broad-leaved specimens with flowers the largest in the series, these largest plants having "been originally included in the last", the "last" being the more slender and narrower-leaved plants with perianth "2 or 3 lines long" and called by Watson "S. ANGUSTIFOLIUM, Gray", based on *Veratrum angustifolium* Pursh. Pursh had the plant which, shortly before, had been described by Ker as *Helonias graminea*, Pursh not realizing that this plant was later to be distinguished by Small on account of its "Perianth white", for Pursh brazenly wrote "Flowers greenish yellow". Pursh's species came from "high mountains of Virginia and Carolina" and a specimen (with an unpublished name) collected by him and bearing his label "Veratrum [unpublished trivial name somewhat equivalent to *angustifolium*], P. Salt pond mountain", is in his herbarium at the Academy of Natural Sciences of Philadelphia. This, with perianths obviously herbaceous (not white and petaloid), and about 6 mm. long, which may pass as presumably the type, has the capsules nearly erect, not at all "deflexed". Similarly, plants which have the medium-sized perianth and firm narrow leaves of true *S. gramineum* may have the capsules as erect as in theoretically ideal *S. robustum* (PLATE 1039, FIG. 3). Such specimens of *S. gramineum* are shown in PLATE 1037, FIG. 3, from Pisgah Forest, North Carolina, *House*, no. 4040. Others, with the pedicels no more erect than in some Pennsylvanian specimens of *S. robustum* (PLATE 1040, FIG. 3, from New Texas, Lancaster County). Such fruiting racemes are shown in PLATE 1038, this specimen from Springfield, Ohio.

Most unfortunately Watson designated no type for his *Stenanthium robustum* and, still more unfortunately, he left others to find out just what he intended by his species of "Pennsylvania to Ohio, Tennessee and South Carolina." A single sheet only bears his inscription "S. robustum, n. sp." in a delicate pencil-notation easily overlooked. This, PLATE 1039, FIGS. 1 and 2, was from Sligo Furnace, Clarion Co., Pennsylvania, Aug. 1859, *J. R. Lowrie* (distributed by Porter) and must stand as the

TYPE. As will be seen from the photograph, the capsules on the lateral racemes are on almost as divergent pedicels as those of *S. gramineum* (PLATE 1038, FIG. 3). I get little satisfaction out of "Perianth green: capsule erect" as opposed to "Perianth white: capsule deflexed".

Taking the one sheet which Watson marked *S. robustum* as the type, the stout and very leafy stem and the broad leaves, accompanied by perianths 8 or 9 mm. long, set the standard; and it at once becomes apparent that such plants, with bases of stem up to 1.5 cm. thick (as opposed to a maximum of 1 cm.), with larger leaves 1–3 cm. broad (as opposed to 4–15 mm.) have the very smooth and translucent leaves thin or membranaceous and with the very many (up to 61) nerves immersed in the tissue (PLATE 1039, FIGS. 2 and 4, PLATE 1040, FIG. 2). In the usually more southern *S. gramineum* and var. *micranthum*, on the other hand, the firm or coriaceous and mostly narrow leaves have prominent elevated ribs, these giving the upper leaf-surface a closely furrowed or corrugated appearance when dry (PLATE 1037, FIG. 2, PLATE 1038, FIGS. 2 and 6, and PLATE 1041, FIG. 2)[1]. Occasionally plants with all other characters of typical *S. gramineum* (PLATE 1038, FIG. 3) will diverge in foliage, showing thin but narrow leaves (FIG. 4) too strongly approaching those of *S. robustum*. The failure of this last character, so hopefully worked out, leaves nothing absolute to separate the larger-flowered *S. gramineum* and the smaller-flowered *S. robustum* as species.

Turning in the other direction, we find along the mountains from western Virginia and eastern Tennessee southward a series of slender-stemmed and narrow-leaved plants with flowers strikingly smaller than in typical *S. gramineum*. The perianths are either herbaceous or petaloid in texture, sometimes greenish or purplish, sometimes white, and the sepals and petals vary from lance-attenuate to linear-oblong and bluntish. The inflorescence is strongly suggestive of smaller panicles of typical *S. gramineum*. This plant evidently passes through its larger-flowered individuals into the smaller-flowered extreme of *S. gramineum*. I am calling it var. *micranthum* (PLATE 1041).

[1] These differences stand out sharply, without aid of a hand-lens, through the reading-glasses prescribed after the removal of a cataract. The late K. K. Mackenzie boasted of his "microscopic vision". It is hoped the the present writer will not see what others can not visualize!

Photo B. G. Schubert

STENANTHIUM GRAMINEUM, var. TYPICUM: FIG. 1, portion of flowering plant, × 1; FIG. 2, portion of leaf, × 2; FIG. 3, portion of fruiting plant, × 1.

Photo B. G. Schubert

STENANTHIUM GRAMINEUM, var. TYPICUM: FIG. 1, portion of inflorescence, × 1; FIG. 2, portion of leaf, × 2; FIG. 3, portion of fruiting panicle, × 1; FIG. 4, portion of leaf, × 2; FIG. 5, terminal fruiting raceme, × 1; FIG. 6, portion of leaf, × 2.

Photo B. G. Schubert

STENANTHIUM GRAMINEUM, var. ROBUSTUM: FIG. 1, portion, × 1, of TYPE of *S. robustum* S. Watson; FIG. 2, portion of leaf, × 2, from TYPE; FIG. 3, portion of terminal fruiting raceme, × 1; FIG. 4, portion of leaf, × 2.

Photo B. G. Schubert

STENANTHIUM GRAMINEUM, VAR. ROBUSTUM: FIG. 1, portion of inflorescence, × 1; FIG. 2, portion of leaf, × 2; FIG. 3, summit of inflorescence, × 1; FIG. 4, terminal flowering raceme, × 1.

Thus, from the coarse and relatively northern *S. gramineum*, var. *robustum* through the commoner and much wider-ranging true *S. gramineum*, thence on to the tiniest of the series, the southern var. *micranthum*, we have a confluent series, the two most extreme variations with distinctive areas of development. I see no way but to treat them as three geographic varieties. The material in the Gray Herbarium alone suggested three probable species. The large representation in the United States National Herbarium, the herbarium of the Academy of Natural Sciences of Philadelphia, and that of the New York Botanical Garden, for the use of which I am greatly indebted to Drs. Maxon, Pennell and Seaver, respectively, have destroyed all my illusions! As the best I can now do I propose the following definition of the three varieties.

a. Stem (dry) 4–10 mm. thick at lowest exposed internode; leaves rather crowded below, rapidly diminishing below panicle, firm to coriaceous, mostly opaque, the larger ones 4–15 mm. wide, their prominently raised ribs producing a corrugated surface; panicle lax, the branches distant, the flowers mostly subremote along the often flexuous branches; perianth 3–8 (–10) mm. long; capsules ovoid-urceolate, 6–9 mm. long, on spreading to reflexed pedicels; seeds 5–5.5 mm. long.
Stem 0.5–1.9 cm. high, 4–10 mm. thick at base; perianth 5–10 mm. long. . . . . *S. gramineum* var. *typicum.*
Stem 0.25–1 m. high, 1.5–5 mm. thick at base; perianth 3–4.5 (–5) mm. long. . . . . Var. *micranthum.*

a. Stem (dry) 7–15 mm. thick at lowest exposed internode, up to 1.8 m. high; leaves crowded and numerous nearly up to panicle, thin and membranaceous, translucent, the larger ones 1–3 cm. wide, their ribs mostly immersed in the tissue; panicle usually dense, with flowers crowded along the stiffly ascending branches; perianth 5–10 mm. long; capsules oblong-subcylindric, 9–10 mm. long, crowded and ascending to horizontally spreading; seeds 5–8 mm. long. . . . . Var. *robustum.*

S. GRAMINEUM (Ker) Morong, var. **typicum.** *S. gramineum* (Ker) Morong in Mem. Torr. Bot. Cl. v. 110 (1894). *Helonias graminea* Ker (Gawler) in Curtis's Bot. Mag. xxxix. t. 1599 (Nov. 1, 1813). *Veratrum angustifolium* Pursh, Fl. Am. Sept. i. 242 (1814). *Xerophyllum gramineum* (Ker) Nutt. Gen. i. 236 (1818). *Veratrum* (subgen. *Stenanthium*) *angustifolium* (Pursh) Gray in Ann. Lyc. N. Y. iv. 120 (1837). *S. angustifolium* (Pursh) Kunth, Enum. iv. 190 (1843). *S. angustifolium*, **S. gramineum* (Ker) Kunth, l. c. (1843).—Rich woods, thickets and borders of bottoms, northwestern Pennsylvania to Illinois and Missouri, south to southeastern Virginia, upland to northwestern

Florida and Alabama, and to Louisiana and eastern Texas. PLATES 1037 and 1038.

Var. MICRANTHUM Fernald, supra.—Upland woods, western Virginia and eastern Tennessee to northwestern Florida and Alabama. PLATE 1041.

Var. ROBUSTUM (S. Watson) Fernald, supra. *S. robustum* S. Watson in Proc. Am. Acad. iv. 278 (1879).—Southeastern Pennsylvania, Maryland and District of Columbia to Indiana. PLATES 1039 and 1040.

THE IDENTITY OF SISYRINCHIUM ANGUSTIFOLIUM (PLATES 1042–1044).—In 1865, in the 4th edition of his Manual, Asa Gray recognized one species of *Sisyrinchium* in eastern North America, the all-inclusive *S. Bermudiana* L., with two varieties: var. *anceps* (*S. anceps* Cav.) with "broadly winged scape" and var. *mucronatum* (*S. mucronatum* Michx.) "with slender and narrowly winged scape". By the 6th edition of the Manual Watson (and Coulter), conscious that the continental North American plants are not the restricted *S. Bermudiana* of Bermuda, recognized two species: *S. angustifolium* Mill., with "Scape . . . *simple, the spathe solitary* and terminal", and *S. anceps* Cav. with "Scape . . . usually branching and bearing 2 or more peduncled spathes". Then came Bicknell's amazing revelation that in temperate North America there are very many morphologically and geographically segregated species, although Bicknell went much farther in his splitting than others have been able to follow. Nevertheless, in Atlantic North America Bicknell clearly differentiated at least a score of species which all careful students must recognize. So absorbed, however, was Bicknell in his newly discovered small world that he did not carefully trace to their sources some of the earlier-named plants.

One of his earliest papers, his *Studies in Sisyrinchium—III: S. angustifolium and some related Species new and old*, in Bull. Torr. Bot. Cl. xxvi. 335–349 (1899), started with the basic assumption that the identity of the first segregate from the Linnean all-inclusive *S. Bermudiana* was settled. His *S. "angustifolium* Mill.", with three synonyms (besides *S. Bermudiana* L. in part), *S. gramineum* Lam. (1783), *S. anceps* Cav. (1788) and *S. montanum* Greene (1899), was described as "stiff and erect . . . Leaves . . . 1.5–2.5 mm. wide (1–3.5 mm.) . . . : stems simple and leafless, or occasionally bearing a single leaf subtending 1 or 2

branches . . . , 1–2 mm. or even 3 mm. wide, wing-margined . . . : spathes erect, green or sometimes purplish-tinged; outer bract 2–6 cm. long, surpassing the inner one 1.5–4 cm., rarely less than twice its length, . . . clasping for 2–6 mm. at base . . . ; interior scales silvery white, narrow, usually about half the length of the inner bract: flowers 1–8, violet-blue; perianth 10–12 mm. long; . . . pedicels erect or nearly so, 17–25 mm. long, shorter or slightly longer than the inner bract: capsules 4–6 mm. high, . . . pale, but often clouded with brownish-purple".

Then Bicknell continued: "This species is far more widely distributed than any other one of its genus, ranging from Newfoundland and New Jersey to Saskatchewan and Montana and southward along the eastern mountains to Virginia [only Mountain Lake, 4000 ft. alt. cited] and in the west to southern Colorado". In his introductory paragraph Bicknell had said: "The common Blue-eyed Grass of the eastern states, *Sisyrinchium angustifolium* Miller, may be taken as representative of a section of the genus *Sisyrinchium*, embracing those species having simple leafless stems with terminal spathes . . . the simple-stemmed species are, as a group, of more northern and alpine distribution than those which develop pedunculate spathes from one or more leaf-bearing nodes, while, on the other hand, the species having a definitely compound system of branching are all distinctive southern".

Thus was set up for all of us, who have found it easier to follow the course of least resistance, a standard misconception of what Miller was supposed to have meant by *Sisyrinchium angustifolium*, what Lamarck had as *S. gramineum* and Cavanilles as *S. anceps*, although Miller and Cavanilles had described or shown the spathes as peduncled and all had cited or illustrated plants with peduncles, and with pedicels far from "erect or nearly so, . . . shorter or slightly longer than the inner bract" of Bicknell's *S. "angustifolium"*.

Starting with *Sisyrinchium angustifolium* Miller, Gard. Dict. ed. 8, sp. no. 2 (1768), we get a brief account of a plant cultivated in England, *with peduncles* and small pale blue flowers:

> 2. Sisyrinchium (*Angustifolia*) foliis lineari-gladiolatis pedunculis longioribus [than in the preceding *S. Bermudiana*]. *Sisyrinchium with linear sword-shaped leaves, and longer foot-stalks to the flower* [longer than in true *S. Bermudiana*]. Bermudiana graminea, flore minore caeruleo.

Hort. Elth. 49. *Grass-leaved Bermudiana with a smaller blue flower.*

. . . . . .

The second sort grows naturally in Virginia; this hath a perennial fibrous root, from which arise many very narrow spear-shaped leaves about three inches long, and scarce an eighth part of an inch broad, of a light green colour, and entire. The stalks rise about three inches high; they are very slender, compressed and bordered like those of the first [*S. Bermudiana*], and have short, narrow, sword-shaped leaves, whose base embrace them; they are terminated by two small pale blue flowers, inclosed in a two-leaved sheath, standing upon longer foot-stalks than those of the other.

The identification by Miller of his *Sisyrinchium angustifolium* with long peduncles and small pale blue flowers on "longer" foot-stalks, with the plant described and illustrated by Dillenius as cultivated in the English gardens in 1732, has real significance, although Bicknell did not note it, just as he apparently did not even read Miller's description in Gard. Dict. ed. 8 (1768), the first place of publication of the binomial *S. angustifolium*. Instead, Bicknell started *S. angustifolium* from the polynomial ed. 7 (1759), where neither the name nor the adjective *angustifolium* is found. Here is what Miller gave in 1759:

2. SISYRINCHIUM *foliis lineari-gladiolatis, pedunculis longioribus. Sisyrinchium* with linear Sword-shaped Leaves, and longer Foot Stalks to the Flower. This is the *Bermudiana graminea, flore minore caeruleo. Hort. Elth.* 49. Grass-leaved *Bermudiana* with a smaller blue Flower.

This nonbinomial account, which alone was cited by Bicknell, was followed by the same statement as in ed. 8, that the plant "grows naturally in *Virginia*", etc.

Now, if we turn to the basic treatment by Dillenius, in his Hortus Elthamensis, 49, t. XLI, fig. 49 (1732) we find his *Bermudiana graminea, flore minore caeruleo* described, not merely as "three inches high", as evidently misquoted by Miller, but up to a foot high: "PLANTA est palmaris, dodrantalis & pedalis"; the leaves full green ("folia . . . saturanter viridia"); the stem 2-forked ("Caulis . . . in summitate bifariam dividatur"). The plate shows as fig. 48 a plant of true *Sisyrinchium Bermudiana*, with erect and but slightly exserted pedicels, as described by Bicknell for *S. angustifolium* sensu Bickn., not Mill.; and as fig. 49 (our PLATE 1042, FIG. 1) *Bermudiana graminea, flore minore caeruleo*, two plants, the taller 1.6 dm. high and with forked scape, the other with simple scape. Both show narrow sepals and petals

Photo B. G. Schubert

STENANTHIUM GRAMINEUM, var. MICRANTHUM: FIG. 1, inflorescence, × 1, of TYPE; FIG. 2, portion of leaf, × 2; FIG. 3, portion of fruiting plant, × 1.

SISYRINCHIUM ANGUSTIFOLIUM Mill.: FIG. 1, TYPE, i. e. *Bermudiana gramineo, flore minore caeruleo* Dillenius, t. xli. fig. 49, × 1, after *Dillenius;* FIG. 2, *S. anceps* Cav., × 1, after *Cavanilles.*

S. MUCRONATUM Michx.: FIG. 3, *Sisyrinchium caeruleum parvum, gladiato caule, Virginianum*, after *Plukenet*, cited by Lamarck under *S. gramineum* Lam., in part, not Mill.

5–10 mm. long and, most important of all, slender fruiting pedicels reflexed or recurving from the spathes, quite as in *S. graminoides* Bicknell, Bull. Torr. Bot. Cl. xxiii. 133, pl. 263 (1896), for Bicknell's plate (our PLATE 1043, FIGS. 1 and 2) shows bifurcate and simple stems from the same base, quite as did that of Dillenius, and 2–4 arched to recurving elongate pedicels, while his description of his *S. graminoides* contains the following items: plant 6 inches to 2 feet high (up to a foot acc. to Dillenius), green or somewhat glaucous (full green acc. to Dillenius); leaves and stem "mostly 1½″–2″ wide" (Dillenius showed them approximately the same, 3–4 mm.); "Stem dividing . . . into two . . . branches. Not infrequently simple and leafless scapes rise among the normally branched ones, simulating the stem of *S. angustifolium*" (Dillenius said "Caulis . . . in summitate bifariam dividatur" but, like Bicknell, showed also a simple stem); "Capsules . . . disposed to be spreading or even recurved on slender pedicels" (Dillenius showed them definitely so), not erect or nearly so as shown in *S. angustifolium* sensu Bicknell (our PLATE 1043, FIG. 3), not Miller.

It is fortunate that Dillenius gave a good illustration of *Sisyrinchium graminoides* Bicknell (as *Bermudiana, flore minore caeruleo*), for in his discussion Dillenius refers to it, as a "figura . . . vitiosa exhibita", the *Sisyrinchium caeruleum parvum gladiato caule Virginianum* of Plukenet, Phyt. t. lxi. fig. 1 (our PLATE 1042, FIG. 3), for the latter figure, although "vitiosa" for the Dillenian species, was a good one of the common Virginian *S. mucronatum* Michx.!, the type of which I studied in 1903 and which is definitely the plant we now know under that name.

Next among the older species included by Bicknell in his usually simple- and winged-stemmed and relatively northern *Sisyrinchium "angustifolium"*, with erect or nearly erect short pedicels is *S. gramineum* Lam. Encycl. i. 408 (1783). Lamarck gave a clear description of a Virginian plant which can hardly be waved aside, as one might be tempted to do, and he also gave as synonyms the conventional *S. Bermudiana* var. α L., which included at least the Dillenian plant, already discussed, and the Plukenet illustration (our PLATE 1042, FIG. 3) of a Virginian plant, which is evidently *S. mucronatum* Michx. (1803). That Lamarck in 1783 had before him a really new species is possible,

from his description. That it was the plant of Plukenet's t. 61, fig. 1 is seemingly apparent and that it was the characteristic plant, common at least in eastern Virginia, which in 1803 Michaux described from Pennsylvania as *S. mucronatum* seems possible from Lamarck's very clear description:

> 1. Bermudienne graminée, *Sisyrinchium gramineum. Sisyrinchium caule simplici alato, spathis inaequalissimis flores superantibus.* N. *Sisyrinchium angustifolium.* Mill. Dict. n°. 2. *Sisyrinchium caeruleum parvum, gladiato caule, Virginianum.* Pluk. Alm. 348. t. 61. f. I. *Bermudiana graminea, flore minore caeruleo.* Dill. Elth. 49. t. 41. f. 49. *Sisyrinchium Bermudiana.* Lin. var. *a.*
>
> Les feuilles de cette plante sont très-étroites, linéaires, graminées, lisses ou sans nervures bien remarquables, & s'engaînent à leur base par le côté, comme celles des Iris: les tiges sont presque filiformes, simples pour l'ordinaire, comprimées, bordées dans leur longueur de deux petites aîles ou membranes courantes, & hautes de six ou sept pouces. Chaque tige est terminée par deux écailles spathacées, fort inégales, l'extérieure étant une fois plus longue que l'autre, & dépassant toujours les fleurs, qui sont petites, bleuâtres, & communément au nombre de deux. Cette plante croît naturellement dans la Virginie; on la cultive au Jardin du Roi. ♃. (*v. v.*)

In Virginia the only species of *Sisyrinchium* known with consistently unforking stems are *S.* "*angustifolium*" sensu Bicknell, already somewhat discussed, and in Virginia definitely montane; *S. mucronatum* Michx., frequent; and the southern and capillary-leaved *S. capillare* Bicknell, a very rare and very distinct species with paired sessile spathes, of flat pineland or bog of the Coastal Plain, only twice found in the southeasternmost counties. That *S. gramineum* of Lamarck could have been *S. mucronatum* is evident from the slender ("almost filiform") stems bordered by 2 little wings; whereas, if it were *S.* "*angustifolium*" sensu Bicknell, which is less likely to have reached the Jardin du Roi from Virginia, we should expect less emphasis on the slenderness. Whether Lamarck had either of these becomes, perhaps fortunately, unimportant, since he cited as an unquestioned synonym *S. angustifolium* Mill. Dict. no. 2. By the International Rules Lamarck's *S. gramineum* is, therefore, illegitimate because (Art. 60[1]) "there was a valid name for the group to which it was applied, with its particular circumscription, position and rank". Thus the identity of the plant actually described by Lamarck becomes an academic question only. S. mucronatum Michx., published without entangling bibliography, stands.

Returning to Bicknell's enumeration of supposed synonyms of his *S.* "*angustifolium*" we next come to *S. anceps* Cav. Diss. vi. 345, t. cxc, fig. 2 (1788), and we almost repeat the story. This plant (our PLATE 1042, FIG. 2), "*Habitat in Virginia*", described "Caule simplici ancipite saepius aphyllo", was shown as either simple or with a fork at the axil of the cauline leaf, just as in the Dillenian plate of *S. angustifolium* and in Bicknell's plate (our PLATE 1043, FIGS 1 and 2) of his *S. graminoides*, while the long-exserted pedicels are too suggestive of Bicknell's illustration of his *S. graminoides*. Here, then, is the same old plant of European gardens, *S. angustifolium* Mill. (not sensu Bicknell) and, to cap the climax, Cavanilles calmly gave as the same as his reputedly new *S. anceps* the following synonyms: *S. Bermudiana* var. α L.; *S. gramineum* Lam.; *S. angustifolium* Mill., the pre-Linnean *S. caeruleum parvum, gladiato caule, virginianum* of Plukenet, Alm. 348, t. 61, fig. 1, and the much discussed *Bermudiana graminea, flore minore coeruleo* of Dillenius. Then, for full measure, Cavanilles added a new synonym: "S. Minus. R. H. P. [Roy. Hort. Paris, *i. e.* Jardin du Roi, whence Lamarck got his material of *S. gramineum*]". Thus, *S. anceps* started off with all the previously published names for the North American plants encumbering it; and by the same Rule which invalidates the name *S. gramineum* Lam. the name *S. anceps* is also illegitimate.

The last name cited by Bicknell as synonymous with his *Sisyrinchium* "*angustifolium*" is *S. montanum* Greene, Pittonia, iv. 33 (1899), described from the mountains of Colorado. Here, at last, is a resting-place for the commonest and most widespread species of the genus in Canada and the Northern States, but, even so, the common plant of the East and Northeast cannot really rest. Most of the Northeastern plants have the leaves and stem full green, the green or purple-suffused capsules becoming dull brown or greenish-purple, when ripe changing to almost blackish (PLATE 1044, FIG. 3). Greene's *S. montanum*, an ISOTYPE shown in our PLATE 1044, FIGS. 1 and 2, is pale or whitish-green, with the capsules whitish-brown or pale-stramineous. In the East it occurs along the limy valleys of the Gaspé Peninsula and Anticosti; it is also in western New York, along the Ottawa River, on the limestone of Bruce Peninsula and in northern Michigan and Minnesota. So far as I can find there is

no published name for the common deeper green and darker-fruited and not prevailingly calcicolous eastern plant.

To summarize, the species of Sisyrinchium here specially discussed are

Sisyrinchium angustifolium Mill. Dict. ed. 8, 2 (1768), based largely, if not wholly on *Bermudiana graminea, flore minore caeruleo* Dill. Hort. Elth. 49, t. XLI, fig. 49 (1732). *S. Bermudiana* L. Sp. Pl. 954 (1753) at least as to citation of Dillenius. *S. foliis lineari-gladiolatis, pedunculis longioribus* Mill. Gard. Dict. ed. 7, no. 2 (1759). *S. gramineum* Lam. Encycl. i. 408 (1783) in part. *S. anceps* Cav. Diss. vi. 345, t. cxc, fig. 2 (1788). *Ferraria pulchella* Salisb. Prodr. 42 (1796), in part, as based on *S. anceps* Cav. (illegitimate substitute). *S. graminoides* Bicknell in Bull. Torr. Bot. Cl. xxiii. 133, plate 263 (1896). Our plates 1042, figs. 1 and 2, and 1043, figs. 1 and 2.

S. montanum Greene, Pittonia, iv. 33 (1899). Plate 1044, figs. 1 and 2. *S. angustifolium* sensu Bicknell in Bull. Torr. Bot. Cl. xxvi. 336 (1899), in part only. *S. septentrionale* Bicknell in Bull. Torr. Bot. Cl. xxvi. 452 (1899), the slenderest extreme.—Plant pale green, not much if at all darkened in drying; capsules whitish-brown or pale-stramineous, not becoming blackish in age.—Calcareous and other mountains and river-gravels and openings, western Newfoundland to Mackenzie and northern British Columbia, south to Anticosti Island and Gaspé Peninsula, Quebec, southern Ontario, western New York, Michigan, northern Indiana, northern Illinois, Iowa, Nebraska, Colorado, Utah and southern British Columbia. All material I have seen from Michigan and Manitoba northwestward and westward belongs here. Characteristic eastern specimens (selected from a larger series) are: Newfoundland: dry limy barrens, upper slopes and tablelands, alt. 200–300 m., Table Mountain, Port-au-Port Bay, *Fernald & Wiegand*, no. 4252, *Fernald & St. John*, no. 10,814 (both as *S. septentrionale*). Quebec: Anticosti I., graviers calcaires, many colls., from *Victorin & Rolland-Germain* (some of them with *Louis-Marie*): no. 20,333 (Rivière Vaureal), 20,334 (R. au Saumon), 20,335 (R. à la Patate), 24,233 (R. Jupiter), 24,234 and 27,108 (Pointe Sud-Ouest), 27,109 (R. Chicotte), 27,110 (R. Dauphine), 27,111 (R. Natiskotek), 27,112 (R. McKane), 27,113 (R. du Brick); alluvium, banks of Grand River, Gaspé Co., June 30–July 3, 1904, *Fernald;* alluvial thicket between the Forks and Brulé Brook, Little Cascapedia River, Bonaventure Co., July 29 and 30, 1904, *Collins, Fernald & Pease* (*Pease*, no. 4971); alluvium of Little Cascapedia R., *Collins & Fernald*, no. 56; Rivière Petite Cascapedia, *Victorin, Rolland & Jacques*, no. 33,781; alluvium, Grand Cascapedia River, July 12–15, 1905,

Photo B. G. Schubert

SISYRINCHIUM ANGUSTIFOLIUM Mill.: FIGS. 1 and 2, portions of Bicknell's illustrations of *S. graminoides* Bicknell.

S. MONTANUM, var. CREBRUM: FIG. 3, reduced from Bicknell's illustration of *S. angustifolium* sensu Bickneil, not Mill.

Photo B. G. Schubert

SISYRINCHIUM MONTANUM Greene: FIG. 1, portion, × 1, of ISOTYPE.
S. MONTANUM, var. CREBRUM Fernald: FIG. 2, fruiting portions, × 1, of TYPE.

Williams, Collins & Fernald; alluvium of Bonaventure River, Bonaventure Co., Aug. 5, 6 and 8, 1904, *Collins, Fernald & Pease* (*Pease*, no. 5780); gravelly beach, Carleton Point, Carleton, July 21, 1904, *Collins & Fernald;* dry calcareous sand back of beach, Tracadigash Point, Carleton, *Fernald & Weatherby*, no. 2426; sur le barachois, Carleton, *Victorin, Rolland & Jacques*, no. 33,576; Chicoutimi, Saguenay River, Aug. 3, 1892, *Kennedy*. NEW YORK: low field 2½ miles northwest of Waterloo, Seneca Co., *Wiegand, Eames & Randolph*, no. 11,801; low meadow, Victor, Ontario Co., *House*, no. 17,489. ONTARIO: east of Davis Swamp, Ottawa, *J. Macoun*, no. 86,675; Casselman, *J. Macoun*, no. 4387, crevices and talus of hornblendic cliffs and ledges, Cloche Peninsula, Manitoulin Distr., *Fernald & Pease*, no. 3244; dry limestone flats, Cloche Peninsula, *Fassett*, no. 14,570; Hay Bay, Tobemory, Bruce Peninsula, *Krotkov*, no. 7281; open glade, Jack Fish, Thunder Bay Distr., *Pease & Bean*, no. 23,547; Sleeping Giant, Thunder Bay Distr., *Taylor, Losee & Bannan*, no. 915.

S. MONTANUM, var. **crebrum,** var. nov. (TAB. 1044, FIG. 3) foliis saturante viridibus; capsulis viridibus vel purpurascentibus deinde plus minusve atrobrunneis.—Foliage and stem deep green, drying dark or blackish; capsules green or purple-tinged, in age fuscous-brown or blackish.—Southwestern Greenland; Newfoundland to Ontario, south to Nova Scotia, New England and Pennsylvania, and mts. to western Virginia (according to Bicknell). TYPE from Clark's Point, Southwest Harbor, Maine, August 17, 1890, *Edward L. Rand* (in Herb. Gray.).

In addition to the type the following, from twenty times as many sheets, are cited as characteristic. GREENLAND: Nünatàrssüak, 65° 25′ N., 49° 50′ W., August, 1932, *J. Iversen*. NEWFOUNDLAND: by rill on steep siliceous slope of Joan Plains Hill, Bay Bulls, *Fernald, Long & Dunbar*, no. 26,528; dry soil in fields, near Topsail, Conception Bay, *Howe & Lang*, no. 1219; Glenwood, *Fernald & Wiegand*, nos. 5196 and 5198; dry burned crests north and east of Tilt Cove, *F. & W.*, no. 5199; Grand Falls, *F. & W.*, no. 5195; Port Saunders, *F. & W.*, no. 3094; Cow Head, *F. & W.*, no. 3091; river-gravel, mouth of McKenzie River, Bonne Bay, *Fernald, Long & Fogg*, no. 1531; Lark Harbor, *F. L. & F.*, no. 188. QUEBEC: Natashquan, *St. John*, no. 90,327, *Victorin & Rolland*, no. 28,543; Cap de l'Est, Anticosti, *Victorin & Rolland*, no. 27,105; graviers de platières, Rivière la Loutre, *Victorin & Rolland*, no. 24,235; La Madeleine, Gaspé Co., *Rousseau*, no. 31,099; Mont-Saint-Pierre, Gaspé Co., *Victorin, Rolland & Jacques*, no. 33,229; peaty headland, Cap au Renard, Gaspé Co., *Fernald & Pease*, no. 24,968; Isle-aux-Courdes, *Victorin*, no. 4192; Lac St.-Jean, *Victorin*, no. 15,957; Ile-aux-Basques, Co. de Temiscouata, *Victorin, Rolland & Jacques*, no.

33,042; sable, nord de Mont-Laurier, Senneterre, *Victorin, Rolland & Dominique*, no. 204. MAGDALEN ISLANDS: dry sandy field, Wolf Island (Pointe du Loup), *Fernald, Bartram & Long*, no. 7214. PRINCE EDWARD ISLAND: dry clearings, Alberton, *Fernald & St. John*, no. 7213. NEW BRUNSWICK: dry gravel-pavement, Belledune Point, *Fernald & Pease*, no. 24,969; sandy shore, Bathurst, *S. F. Blake*, no. 5387; damp place in field, Deep Cove, Grand Manan, *C. A. & Una F. Weatherby*, no. 5530. NOVA SCOTIA: Barrasois River, Cape Breton, *G. E. Nichols*, no. 611; gravelly beach, Guysborough, *Rousseau*, no. 35,352; gravelly beach of Third Lake, Windsor Junction, *Fernald & Long*, no. 20,806; seepy banks and moist fields, Yarmouth, *Bissell, Pease, Long & Linder*, no. 20,793. MAINE: dry fields, Blaine, *Fernald*, no. 2493; Peaked Mt., Clifton, Aug. 22, 1897, *Fernald;* roadside, Newry, *Pease*, no. 28,376; dry pasture, Roque Bluffs, Aug. 1, 1911, *C. H. Knowlton;* boggy meadow, Harriman Point, Brooklin, *A. F. Hill*, no. 1347; old orchard, Lincolnville, *G. B. Rossbach*, no. 148; Blackstrap Hill, Falmouth, *Bissell & Chamberlain*, no. 373; York Harbor, Aug. 25, 1896, *Bicknell.* NEW HAMPSHIRE: dry pasture, Martin Location, Coös Co., *Pease*, no. 14,251; Durham, *Hodgdon*, no. 4000; Hookset, June 7, 1921, *C. F. Batchelder.* VERMONT: field, Concord, Essex Co., *Pease*, no. 28,576; Wells River, *Pease*, no. 29,462; sand plain, Swanton, *S. F. Blake*, no. 3153; Manchester, *M. A. Day*, no. 171. MASSACHUSETTS: Essex, June 13, 1896, *E. F. Williams;* Groton, *Harris & Smith*, no. 2678; Boxborough, *Hubbard & Torrey*, no. T521; wet field, Stoughton, June 2, 1909, *Kennedy;* Plymouth, *Fernald & Hunnewell*, no. 15,083; dry sandy oak barrens, Harwich, *Fernald*, no. 16,601; South Ashburnham, *F. F. Forbes*, no. 1085; dry gravelly bank, Ashfield, June 19, 1921, *Churchill et al.;* dry open soil, Middlefield, *Fernald & Long*, no. 9262. RHODE ISLAND: Cumberland, May 30, 1911, *R. A. Ware;* Middletown, May 30, 1908, *E. F. Williams;* Block Island, June 16, 1917, *R. P. Marshall.* CONNECTICUT: dry field, Franklin, May 31, 1906, *Woodward;* moist field, South Britain, *Blewitt*, no. 624; wet meadow, Waterbury, *Blewitt*, no. 567; dry hill, Southington, *L. Andrews*, no. 489; Oxford, June 8, 1902, *Harger;* meadows, Stratford, June 5, 1898, *Eames.* NEW YORK: moist open field, Madrid, *Phelps*, no. 340; Canton, *Phelps*, no. 108; Fort Ann, July 15, 1917, *Burnham;* Oneida Castle, *Maxon*, no. 152; Caroline, *Eames & MacDaniels*, no. 3801; Dryden, *F. P. Metcalf*, no. 2025. PENNSYLVANIA: wooded roadside, Muncy Valley, Sullivan Co., *Fosberg*, no. 15,036; grass-flat in open woods, Leroy, Bradford Co., June 21, 1941, *W. F. Westerfeld.* ONTARIO: dry clearing, Temagami Forest, *W. R. Watson*, no. 6701; open field, Central Island, Toronto, June 18, 1936, *R. J. Eaton;* crevices of sandstone, Corbeil Point, Algoma Distr., *T. M. C. Taylor et al.*, no. 705.

Some Orchids of the Manual Range (Plates 1045–1048).—

Habenaria clavellata (Michx.) Spreng., var. **ophioglossoides,** var. nov. (tab. 1046), a var. typica recedit folio infimo sessile, vix basi prolongato, ovale vel oblongo vel late oblanceolato 1–4 cm. lato, 3–17 cm. longo, longitudine bis vel etiam sexies majore quam latitudine.—Newfoundland and Côte Nord, Que., to western Ontario, south to Nova Scotia, New England, New Jersey, Michigan and northern Wisconsin. Type from Nova Scotia: boggy clearing near Porcupine Lake, Arcadia, Yarmouth Co., Sept. 2, 1920, *Fernald & Long*, no. 20,839 (in Herb. Gray.; isotype in Herb. Phil. Acad.).

Typical *Habenaria clavellata* was based on *Orchis clavellata* Michx. Fl. Bor.-Am. ii. 155 (1803) from Carolina. As shown by the Michaux type (our plate 1045, fig. 1), which, unfortunately, has the tip of the backward-folded leaf covered by the label, he had the characteristic Carolinian and broadly southern plant with the relatively narrow leaf tapering to a subpetiolar base, a full-length leaf from North Carolina shown as fig. 2. Typical *H. clavellata* has the single large leaf narrowly oblong, oblanceolate or spatulate, gradually tapering to a rather definite petiolar base, the leaf varying from 5.5 to 23 cm. long and 0.7–2.7 cm. broad (one twelfth to one fifth as broad as long). All material in the Gray Herbarium from Florida westward to Louisiana and northward to Virginia and Tennessee is typical *H. clavellata*, while this extreme of the species pushes locally northward into the southern area of var. *ophioglossoides*.

The latter, var. *ophioglossoides*, has oval, oblong or broadly oblanceolate leaves rounded to tapering to an essentially sessile (not subpetiolar) base, the blade 3–17 cm. long and 1–4 cm. broad (one sixth to one half as broad as long). It is, as a series, more northern than typical *H. clavellata*, its dominance in the North indicated in the following check of specimens in the Gray Herbarium and that of the New England Botanical Club: from Newfoundland, typical *H. clavellata* 0, var. *ophioglossoides*, 21; Quebec, typical *clav.* 0, var. *oph.* 8; Prince Edward Island, typical *clav.* 0, var. *oph.* 4; New Brunswick, typical *clav.* 0, transition 1, var. *oph.* 7; Nova Scotia, typical *clav.* 0, transition 1, var. *oph.* 23; Maine, typical *clav.* 0, transition 6, var. *oph.* 75; New Hampshire, typical *clav.* and transition 8, var. *oph.* 42; Vermont, typical *clav.* and transition 1, var. *oph.* 12; Massa-

chusetts, typical *clav.* and transition 41, var. *oph.* 17; Rhode Island, typical *clav.* 7, var. *oph.* 1; Connecticut, typical *clav.* 6, var. *oph.* 0; New York, typical *clav.* 8, var. *oph.* 5; Ontario, typical *clav.* 0, var. *oph.* 6; Michigan, typical *clav.* 0, var. *oph.* 6. Too little material is at hand from New Jersey, Pennsylvania and Ohio to Minnesota and Iowa to indicate the relative frequency of the two in those states; but the strong development southward of typical *H. clavellata* and northeastward of var. *ophioglossoides* is clear.

From the citation in Ames, Enum. Orchids U. S. and Canada, 44 (1924) one would infer that, in publishing the basic *Orchis clavellata*, Michaux assigned it earlier synonyms which might render his later name (of 1803) untenable. The first citation in the Enumeration, under synonymy of *H. clavellata* reads: "Orchis clavellata *Michaux*, Flora Boreali-americana, vol. 2, p. 155 (1803), exclude synonymy in part." Reference to Michaux's treatment shows, however, merely the description of the new species, with "*Hab.* in Carolina."[1] As originally published *Orchis clavellata* had no synonymy, so that the validity of the name is unblemished.

Orchis tridentata Muhl. ex Willd. Sp. Pl. iv. 41 (1805) from Pennsylvania, with "Folia *caulina tria, infimum lanceolato-ensiforme dodrantale*" must be the typical relatively southern *Habenaria clavellata*, for the very narrow leaf "nine inches long" can apply only to that, and the material from Lancaster County before me is of typical *H. clavellata.*

(*To be continued*)

[1] Michaux's Flora Boreali-Americana was based on his own collections made during many years of pioneer botanical exploration in eastern North America, just as the Flora Virginica of Gronovius was based on collections made in Virginia by John Clayton, the latter book prepared with the collaboration of the young Linnaeus who, later, based many binomials on the Clayton plants described by Gronovius. This is common knowledge, clearly stated in the two pioneer books. It is, therefore, a bit startling to read in the North American Flora, xxviiiB[2], in the treatment of the *Umbelliferae*, items like the following: *Ptilimnium capillaceum* (Michx.) Raf., resting on *Ammi capillaceum* Michx. Fl. Bor.-Am., with "Type locality: 'In campestribus Carolinae', collector unknown"; or *Thaspium trifoliatum* (L.) Gray, resting on *Thaspia trifoliata* L., from *Clayton*, with Linnaeus citing "*Gron. virg.* 31", said to have its type from "'Virginia', collector unknown". Surely, the editors could have found out. Such entries are similar to the enumerations of states from which species are known, with the state from which the type came omitted.

Photo B. G. Schubert

HABENARIA CLAVELLATA: FIGS. 1 and 2, TYPE of *Orchis clavellata* Michx., × 1, after *Cintract;* FIGS. 3–6, leaves × 1, from various localities.

Photo B. G. Schubert

HABENARIA CLAVELLATA, var. OPHIOGLOSSOIDES: FIGS. 1 and 2, portions of TYPE, × 1; FIGS. 3–6, leaves, × 1, from various localities.

Relict Boreal Plants in Southeastern Minnesota.—It has long been known that several typically boreal plants occur as relicts in Winneshiek and Allamakee counties of northeastern Iowa. These include *Abies balsamea* (L.) Mill., *Mertensia paniculata* (Ait.) G. Don, *Rubus pubescens* Raf. and *Rhamnus alnifolia* L'Hér. Recently, in June 1941, this relict area was found to extend into Fillmore County of southeastern Minnesota and to be represented by a small balsam-fir stand near the town of Wycoff. The firs form a fairly dense stand along the north slope of a steep and narrow valley and seem to have perpetuated themselves by layering. In addition to many species quite typical of this region, the following typically boreal species were found associated with the firs; *Rubus pubescens* Raf., *Rhamnus alnifolia* L'Hér., *Cornus canadensis* L., *Pyrola secunda* L., *Pyrola chlorantha* Sw. and *Mertensia paniculata* (Ait.) G. Don. With the exception of this locality, the last species is known in Minnesota only from the north shore of Lake Superior and the remainder are largely limited to the coniferous forest region of northern Minnesota.—John B. Moyle, Minnesota Department of Conservation, St. Paul.

Another later Homonym.[1]—While going through the cards of the most recent issue (No. 189) of the Gray Herbarium Index, my attention was again drawn to a later homonym which has been in use for twenty years in the *Sapotaceae*. Because of the prior publication of *Manilkara emarginata* H. J. Lam (Bull. Jard. Bot. Buitenz. III **7:** 241. 1925) for an endemic species of the Hawaiian Islands, *Manilkara emarginata* (L.) Britton & Wilson (Bot. Porto Rico **6:** 366. 1926), based on *Sloanea emarginata* L. (Sp. Pl. 512. 1753), was illegitimate when published as a name for the "wild dilly" of southern Florida, the Florida Keys and the Bahama Islands. If one associates this northernmost western-hemisphere member of the genus with several Antillean entities, as Cronquist recently has done (Bull. Torrey Club **72:** 550–562. 1945), the proper name for the species-aggregation would be *Manilkara Jaimiqui* (Wright) Dubard

[1] Thanks are due Mrs. Lazella Schwarten, librarian of the Arnold Arboretum, for her kindness in checking several bibliographic references.

(Ann. Col. Mus. Marseille III **3:** 16. 1915; based on *Mimusops Jaimiqui* Wright in Griseb. Cat. Pl. Cub. 164. 1866).

However, if one considers the "wild dilly" to be a distinct species—and I am at present inclined to take this stand—its proper appellation would seem to be **Manilkara bahamensis** (Baker) Gilly, comb. nov. (based on *Achras bahamensis* Baker in Hook. Icon. **18:** *t. 1795.* 1888). Synonymy of this species would also include[1] *Mimusops floridana* Engl. (Engl. Bot. Jahrb. **12:** 524. 1890), *Mimusops bahamensis* (Baker) Pierre (Not. Sapot. 37. 1891) and *Mimusops emarginata* (L.) Britton (Torreya **11:** 129. 1911).—CHARLES L. GILLY, Department of Botany, Iowa State College, Ames, Iowa.

[1] The name "*Mimusops parvifolia* Radlk." (not *Mimusops parvifolia* R. Br. Prodr. 531. 1810; nor *Mimusops parvifolia* Kurz, For. Fl. Br. Burma **2:** 124. 1877; nor *Manilkara parvifolia* (Kurz) H. J. Lam, Bull. Jard. Bot. Buitenz. III **7:** 269. 1925) is not included in the legitimate synonymy of this species for the reasons stated in the following sentences. Although Pierre (Not. Sapot. 37. 1891) and most subsequent authors have cited this name as "*Mimusops parvifolia* Radlk.", Radlkofer published it as *Mimusops parviflora* (Sitzb. Akad. Wiss. München **12:** 344. 1882), basing his new combination upon "*Achras zapotilla* var. *parviflora* Nuttall", which he cites on the authority of A. Gray. Nuttall, however, published this variety as *Achras zapotilla β parvifolia* (N. Am. Sylv. **3:** 28, *t. 90.* 1849). Unfortunately Asa Gray included Nuttall's varietal name in synonymy under *Mimusops Sieberi* A. DC., which he believed to be the correct name for the "wild dilly", as *Achras zapotilla* var. *parviflora* (Syn. Fl. N. Am. **2:** 69. 1878). This erroneous citation by Gray seems best handled as a superfluous renaming of Nuttall's variety; *Achras zapotilla* var. *parviflora* Nutt. in A. Gray, therefore, is an illegitimate name under Article 60 of the International Rules of Botanical Nomenclature. Subsequent usage of this varietal epithet *parviflora*, including its elevation to specific rank by Radlkofer, is equally illegitimate; this particular epithet *parviflora* is, therefore, unavailable for transfer to the genus *Manilkara.*

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MP 3

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THE GENUS LIATRIS

L. O. Gaiser

The North American genus *Liatris* has been considered one of unusual difficulty. Variability in and intergradations between the species are undoubtedly responsible for the bewildering problems in specific determination. When comparisons of various collections, used for the growing of cytological material, were made with herbarium specimens difficulties arose in the determination of species, and the project grew further into an examination of types and a taxonomic revision. It has seemed that the present summation of results might meet some others' needs as well as my own.

Preliminary work was begun in 1928 by the study of living cultures grown in a garden at Crediton, Ontario, from plants collected by the generous help of many botanists of the United States. Recognition of the great kindness of all those who contributed to that phase of the work will be made elsewhere. Many species have also been collected in the field on a trip in the south-central States, westward through Arkansas and southward through Texas to the Gulf of Mexico. The present treatment is, however, largely the result of an examination of the mass of material at the Gray Herbarium, where work was begun in the summer of 1938, at the New York Botanical Garden, where many types of Small and Rydberg are available, and the National Herbarium, Washington, which possesses a great number of specimens collected by E. S. Steele. Other herbaria have also been visited and particular collections, such as the Greene types

at Notre Dame University, the Nuttall and Pursh specimens at the Philadelphia Academy of Sciences, and the Gates specimens at the Brooklyn Botanical Garden, have been studied. As well, loans from other herbaria, as of Lunell's varieties of *L. scariosa* from the University of Minnesota and the University of Indiana have been of invaluable help. Representative collections received, as from the University of Oklahoma, the A. & M. College of Texas, the University of North Carolina, the National Museum of Canada, and the Fowler Collection from Queen's University, Kingston, have also been greatly appreciated. To all the curators of these and to the owners of private herbaria who have been such a help in making available to me so many specimens for study and comparison, I am greatly indebted and wish to express sincere gratitude. To Prof. I. M. Johnston, I gratefully acknowledge the stimulation and encouragement which involved me in undertaking this taxonomic study. I was immeasurably helped by having Prof. M. L. Fernald show me the photographs of type specimens in the herbarium of the Linnaean Society, London. To Mr. C. A. Weatherby, I am especially indebted for having obtained for me during his visit abroad to the herbaria and museums in London, Paris, and Geneva during the summer of 1939, photographs of many other type specimens, without which this study could not have progressed. From all the staff at the Gray Herbarium has come much appreciated help in occasional conferences which I am happy to acknowledge, as I am also appreciative of the ever generous help of the librarian, Miss R. D. Sanderson. To students who have done what must have been exacting typing for them, goes my most sincere gratitude for their help in the preparation of this manuscript.

In citing specimens from various herbaria the following abbreviations will be used:

G—Gray Herbarium, Harvard University; NY—New York Botanical Garden; US—National Herbarium, Washington; P—Academy of Natural Sciences, Philadelphia; B—Brooklyn Botanical Garden; ND—Greene Herbarium, Notre Dame University; M—University of Minnesota, Minneapolis; I—Indiana University, Indianapolis; T—College of A. & M., College Station, Texas; O—University of Oklahoma, Norman; NC—University of North Carolina, Chapel Hill; Ot—National Museum, Ottawa; Q—Queens University, Kingston, Ontario; To—University of Toronto, Ontario; W—University of Wisconsin, Madison; N—University

of Nebraska, Lincoln; OA—Herbarium of Prof. O. Ames, Ormond, Florida; HB—Herbarium of Mr. Hubert B. Brown, Toronto; WH—Herbarium of Mr. W. H. Herriot, owned by Mr. Monroe Landon, Simcoe, Ontario: F—University of Florida, Gainesville.

General Discussion

Bibliography of the Genus and its chief Subdivisions

Liatris Schreb. Gen. Plant. ii. no. 1263, 542 (1791) (nomen conservandum); Endl. Gen. Plant. no. 2270, 368 (1836–1840); Benth & Hook. Gen. Pl. ii. no. 73, 248 (1873); Engl. & Prantl, Nat. Pflanzenfam. iv. Abth. 5, 142 (1890). *Lacinaria* Hill., Veg. Syst. iv. t. 49 (1762); Porter & Britt. Mem. Torr. Bot. Club, v. 313 (1894). *Laciniaria* Hill, Hort. Kew. 70 (1769); O. Ktze. Rev. Gen. i. 349 (1891). *Psilosanthus* Neck. Elem. i. 69 (1790).

Section I. Euliatris DC. Prod. v. 128 (1836). *Liatris* as limited by Cassini, Dict. Sci. Nat. xxvi. 235 (1823).

Section II. Suprago (Gaertn.) DC. Prod. v. 129 (1836). *Suprago* as limited by Cass. Dict. Sci. Nat. li. 385 (1827).

Generic Characters

Liatris Schreb. Perennial herbs, generally from ovoid or globular corms, but sometimes with much flattened or quite elongate rootstocks; leaves elongate, linear to ovate-lanceolate, sessile or petiolate, more or less conspicuously punctate with impressed and resinous dots, the radical leaves usually much longer than the cauline; stems with numerous spirally arranged leaves, these diminishing upwards as bracts subtending flower-heads: heads of flowers in cymosely disposed spikes, racemes or panicles, rarely a loose open cyme; the heads of 3 to numerous (up to 70) similar, tubular flowers on a naked receptacle surrounded by an involucre of imbricated phyllaries in several series: phyllaries lanceolate, ovate, oblong or orbicular; mucronate-, acute-, or obtuse-tipped, herbaceous, narrowly or broadly petaloid with ciliate or deeply erose margins: corolla phlox-purple, or rarely white, regular, usually glabrous without, commonly dotted with scattered resinous droplets; tube cylindrical, usually exceeding the pappus, or twice as long as the pappus; throat hardly at all or slightly perceptible, glabrous within or with little or much pilosity; lobes 5, equal, ovate, acute, erect, or more or less spreading, glabrous or pilose within: stamens 5, included, filaments filiform, equally inserted below the middle of the corolla-tube, glabrous or with tiny outgrowths; anthers short, oblong, about as long as the filaments: style stiff, bifid and exserted after anthesis: achene somewhat cylindrical but pointed at base, about ten-ribbed, pubescent on ribs and more finely between ribs: pappus of 12–40 bristles, sessile in one or more series, plumose or barbellate.

North American herbs: United States, although not west of the Rocky Mts., southern Canada, and most northerly Mexico.

The Species

Thirty-two species with their varieties and ten hybrids, have been here recognized, though the number of the latter is not definitive. In some cases the wide variety in individuals of an interspecific hybrid has made description impossible. As there is much evidence of intermediate material it is a genus in which it is difficult to draw sharp lines of distinction between the species.

The greatest number of species occur in Florida, at least twelve being known from that state. At the western limits of extension, as in the states of Colorado and Montana or in the province of Alberta, there are probably two species, *L. punctata* Hook. and *L. ligulistylis* (Nels.) K. Sch. In the New England States there is probably but one species, *L. borealis* Nutt. ex MacNab and some intergradations with the species of adjacent districts. In southern Ontario, two species and one stable hybrid occur in the sandy stretches along Lake Erie and southern Lake Huron, *L. cylindracea* Michx., *L. aspera* Michx., × *L. sphaeroidea* Michx. and a third species, *L. spicata* (L.) Willd., only in a limited region along Lake St. Clair. A few species, such as those of the series *Spicatae* (except *L. microcephala* (Small) K. Sch.) and occasional ones, such as *L. ligulistylis*, grow in low grounds around ponds or even in wet lands. Most of the species, however, grow in warm sandy places, as in remaining oak-hickory forests or, as across Texas, along dry railroad tracks. Other species, e. g. *L. turgida* Gaiser, have been more limited to the mountains of the Carolina region, where the Appalachian ranges have harbored a rich assortment of species and extensive colonial growth.

Gross Morphology

Underground Stem. Being perennial plants, all species of *Liatris* have a thickened underground stem from which fibrous roots spread out to anchor the plant. During the first summer of the seedling's growth there develop a few radical leaves above what appears as a slightly thickened tap-root, but at the end of the season an apical bud is developed from a small crown and this, in the second year, produces the first flowering stalk. During

successive summers the stem thickens, becoming globular or remaining ovoid in most species of all series, except the *Spicatae*, *Pycnostachyae* and some of the *Punctatae*. Very singular is the clustered, slender, tuberous formation of *L. Garberi* A. Gray. Except for the roots that come off basally and the buds that develop annually from the central summit into aerial stalks, this stem lacks any investment, such as a membranous scaly coat, and could be spoken of as a naked corm, *sensu* Gray (Gray's Bot. Textb. i. 61–2 (1879)). In accordance with this interpretation we have chosen to use the term corm. In one species there occurs a variation of the generally rounded depressed shape, which appears definitely related to soil conditions. In *L. elegans* (Walt.) Michx., as it is found from Florida westward through the Southern States to Texas and Arkansas, the underground part is commonly small and globular or subovoid. However, specimens from the Carizzo region of Texas, with no marked distinguishing difference of above-ground parts, show an elongated tap-root-like growth up to ten times the usual length of the small ovoid form. Mr. Parks of College Station, in describing this region, writes as follows[1]:

> "The Carizzo sand is an outcrop of the Carizzo formation of the Eocene Age. In Medina, Bexar, and Wilson counties it is a very conspicuous part of the landscape. There is a wooded ridge reaching a height of nearly two hundred feet above the surrounding country. It is a sand dune covered by a climax oak-hickory association. The soft white sand in which the trees grow bears very little vegetation, however in the spring and late fall when the rains occur it is very prolific of annual plants which are of a very short existence. It is needless to say that most of these plants have deep tuberous roots".

Thus it seems clear that, in common with other plants of the region, the effects of varied soil conditions are shown in the modification of shape in the subterranean growth of *L. elegans* and such plants are here recognized as a variety (var. *carizzana*).

In some of the species of the *Spicatae* and the *Pycnostachyae* series, the corm, while growing slightly deeper, broadens comparatively more during the successive years, sometimes to a width of 10 centimeters or more, thus providing a widened crown from which many flower-stalks arise. Such plants have been found to live for more than fifteen years, probably representing the

[1] By private communication.

hardiest of the shallow-rooted species, which advantage, along with the provision of numerous flowering spikes, makes them the favored species in perennial flower-borders. Some buds of broad, old stems grow into new corms and upon separation or death of the old become new individuals[1].

Some species, yet not all, of the *Punctatae* series show a more pronounced elongation during the thickening of the young seedling's subterranean growth into a tough rootstock that grows into the soil, often to the depth of 50 cm. or more. Rarely there has been found a modification of it into a somewhat more prostrate rhizome which sends off aerial shoots at points along its surface, as in *L. densispicata* Bush, in the Anoka sand-dunes of Minnesota. Lack of any such elongation helps to mark off, we believe, such species as *L. mucronata* DC. and *L. angustifolia* Bush from *L. punctata* with which they have been confused.

In the course of a study of internal secretions of some of the *Compositae* Mayberry (Sc. Bull. Univ. Kans. xxiv. 8 (1936)) described resinous secretory canals in the cortex of the underground stem, as large pockets, 0.9 mm. in diameter, in three species of *Liatris* (*L. pycnostachya*, *L. punctata* and *L. aspera*). In the roots, aerial stems and leaves less conspicuous canals, from .03 to .01 mm. in diameter, were also reported.

Leaf. The leaves of most of the species are linear or lanceolate, though in some they are obovate or ovate-lanceolate. The early radical leaves, coming from the crown, are usually much longer than the cauline ones. The latter arise spirally around the flowering stalks and generally show a reduction in length from the base of the stem upwards as they become the subtending bracts of the axillary flower-heads. In some species, however, the leaves are abruptly shortened and there results a long strict spike with setaceous bracts which hardly project beyond the flower-heads. Commonly the leaves are sessile; but sometimes the broader basal leaves are narrowed into a petiole. The leaves are generally firm; in some linear forms they are even coriaceous, as in *L. laevigata* Nutt., though in broader forms they are less so. All variations from glabrous to scabrous blades are found and in many cases within a single species. For example, there can be

[1] In the series *Spicatae* a number of horticultural names have arisen, which have not been exhaustively treated here.

associated with the more distinctive characteristics by which we recognize the species *L. ligulistylis*, such as the few large heads with erect, loose phyllaries, any condition from the complete lack of to a complete covering of hairs on upper and lower surface of the leaves. Thus pubescence has been found to be of little use as a character for specific differentiation. In all species, not only in those of the *Punctatae* series, the leaves have small sunken resinous glands but they may be less conspicuous in some than in others. Pubescence of the leaves may or may not be accompanied with cilia along the margin of the leaf.

INFLORESCENCE. After a period of producing radical leaves, the flowering stalks appear singly on young, or severally (in groups of 2–20) in larger, older plants where a broader crown has developed. These stems are often stiff, tall and erect (as in *L. spicata* and *L. pycnostachya*), and the floriferous portions, being covered with numerous closely-developed flower-heads, have been commonly spoken of as spikes, though the development is determinate rather than indeterminate, and they are therefore false spikes. In all species the apical flower-head is the first to open. All variations from strictly sessile, through short-pedicellate to long-branched-pedunculate flower-heads occur. In many (as especially in the *Scariosae*) there is found variation from a straight spike-like to a pyramidal and paniculate inflorescence, the result of a gradation from the apically sessile flower-heads successively through longer-pedicellate ones to those lowermost which have become very much elongated- and branched-pedunculate. In some species the stems are more slender and tufted with flower-heads more scattered in a raceme-like arrangement which, being again determinate, is correctly a racemiform cyme. In one species (*L. cymosa* (H. Ness) K. Sch.) there is considerable branching and the large flower-heads are borne more distantly in a loose dichotomous cyme-arrangement, giving quite a different appearance from that generally found in the genus. However, that there are intermediate conditions between this and the false spikes, when the less proximate heads occur in a rhipidial cyme-arrangement, is seen in *L. cylindracea* (to which series we have attached *L. cymosa*), and *L. squarrosa* (L.) Willd. of the closely related series. Thus, though for strict correctness the inflorescence should be spoken of as reversely or

falsely spicate and a reversed or determinate raceme, it is expected that the explanation here will suffice to permit an understanding of the unqualified terms used throughout the discussion of the genus. The rachis of the inflorescence is sometimes glabrous and may be striate, as exemplified in *L. microcephala*. More frequently it is pubescent above and glabrous below, though occasionally the entire stalk is puberulent or covered with pubescence of short cinereous or longer hairs.

Flower-Head. The heads in *Liatris* contain from 3–4 to 50–70 flowers. Exceptional are the terminal heads[1], which regularly have a greater number of flowers in almost all species. In some species there is a marked increase in the apical head, as in *L. ligulistylis*. In certain species which normally have few heads, such as *L. cylindracea* and *L. squarrosa* (L). Willd., reduction to one-headed specimens often occurs, perhaps under unfavorable conditions. This has given rise to naming one-flowered varieties, which seems inadvisable to the author. Also in other species having a generally spicate inflorescence of numerous close heads occasional specimens show terminal ones very much larger than the rest, as, for instance, in *L. punctata* var. *turgida* Lunell (Amer. Mid. Nat. v. 241 (1918)). Since specimens with such exceptional terminal fusion of heads have been found to occur in different species, again varietal ranking has not here been recognized. Heads having few flowers may be short, cylindrical, ca. 6–8 mm. long in *L. microcephala*, or quite long and cylindrical as in *L. punctata*—ca. 1.5–2 cm. long. With more flowers per head, as in the *Graminifoliae* series, where approximately one dozen is an average number, the stoutish cylindrical buds give, when the flowers open, heads that are somewhat turbinate in shape. Many-flowered heads are hemispherical, ovoid or almost globular, their outward appearance varying, largely due to the nature of the phyllaries. Measurements given were taken, whenever possible, from heads with open flowers, the width at the tip of the corolla and the length from there to the base of the head.

In species of *Liatris* there is a wider variation in the form of the phyllaries than of the leaves. In those of few-flowered heads

[1] In stating the number of flowers per head in any description of species, heads other than the terminal one, being more uniform, are referred to.

there may be small outer foliaceous, linear or ovate, closely appressed bracts that become gradually more membranous and generally more elongate inwardly. They may, however, vary generally from acute or mucronate to obovate, and may be glabrous, punctate or pubescent. They may also become recurved and slightly colored, though rarely are they petaloid. In the exceptional *L. elegans* (Walt.) Michx., the phyllaries have become much elongated and colorful, either pink or white and, being loosely arranged, give an altogether distinctive appearance. In species with many-flowered heads there occur the same variations in shape, margin and texture of the many phyllaries as in those with few-flowered heads. But there have developed as well many petaloid forms, many of which, without further classification, have sometimes been ascribed to *L. scariosa*, which had thus become a fine "melting pot". In *L. ligulistylis* these petaloid phyllaries with deeply erose margins stand loosely erect. In *L. aspera* Michx. a combination of petaloid and crisped condition is found. In other species, as *L. borealis*, there is only a narrow scarious margin which may become finely ciliolate, and the phyllaries stand loosely erect, while in *L. scariosa*, phyllaries of similar margin may be recurved. The endless intermediates and variations between these prime types has given rise to much confusion. In *L. squarrosa* (L.) Willd. where the recurved condition of the phyllaries has not been accompanied with petaloid development, intermediates between the appressed and the squarrose types have likewise been numerous. In *L. pycnostachya* Michx. the degree to which the phyllaries are reflexed also varies. In the *Spicatae* and *Pycnostachyae* series there is considerable variation from colorful to strictly green herbaceous involucre but care must be taken to compare specimens of the same age since, after flowering time when the seeds mature, phyllaries that had color usually lose it and become green.

Flower. *Corolla.* The corolla is tubular, slightly dilated upwards, with an almost imperceptible narrowing at the throat, and with ovate to lanceolate, acute lobes from ¼–⅓ the length of the tube. The length[1] of the corolla varies from ca. 5 mm. in smaller species to ca. 20 mm. in members of the *Squarrosae* series. The wide-spreading lobes of two sections represented by

[1] Measurements were made after boiling the corolla.

L. squarrosa and *L. cylindracea*, having the largest corollas, have, since the time of Nuttall's observation "internally villous" (Nutt. Gen. ii. 132 (1818)), been characterized as "hairy within" (Gray, Man. Bot. ed. 7). Colorless cellular outgrowths, ca. 2 mm. long in *L. cylindracea*, can be seen projecting along the margin of the lobes in fresh flowers without the aid of a hand-lens. The throat of the corolla-tube of many species appears almost translucently clear both in pressed and fresh specimens, but in others does not. Within the tube of all species, five stamens, having filaments about equal in length to the laterally united anthers, are inserted about the middle of the throat. By splitting the tube with a fine needle and examining it with a dissecting lens, small colorless cellular hair-like outgrowths ca. 50–100 μ long (which is only a fraction of the length of those on the lobes of *Squarrosae* species) are sometimes found to be abundant about and below the region of stamen-attachment in the throat. In one series, *Tenuifoliae*, smaller outgrowths come from the filaments. Quite unexpectedly, the presence of this pilosity within the throat of the corolla proved to coincide with other diagnostic characters in some pairs of species that were otherwise difficult to separate, and specific differentiation was thereby strengthened: as, for example, *L. spicata* without and *L. graminifolia* (Walt.) Willd. with hairs; or *L. ligulistylis* without and *L. aspera* with hairs. Care must be exercised since on hasty examination fungal filaments, sometimes found in herbarium specimens might be mistaken for such pilosity.

Commonly on microscopic examination of herbarium specimens, tiny resinous droplets are seen distributed over the corolla, but, as the occurrence of such probably transitory secretions was not consistent for all specimens of a species, no proof of their lack in any species was found.

Color. *Liatris* flowers are all of approximately one color, somewhere near phlox-purple by Ridgway's color chart, though they vary in intensity of the shade, except for the occasional white forms. The latter differ in no way from the species' descriptions except for the corolla-color. The one general[1] exception is in *L. elegans*, where the phyllaries, which are so much

[1] A singular example of a yellow corolla is found in *L. elegans* f. *Fisheri* Standley (Field Mus. Pub. xi. 275 (1936)), a plant with "both the flowers and the long petal-like tips of the bracts lemon-yellow in color".

expanded and which add much beauty, as the name of the species suggests, to the heads are white and green accompanying white or mauve-tinted flowers, or there may be pinkish-green bracts accompanying the white flowers. Through southern Arkansas and Texas, where I have observed the species, the white- and purplish-flowered plants seemed equally abundant and successful and yet but one species could be recognized. The author's experience in transplanting white-flowered forms of at least four other species along with those of normal color (*L. aspera*[1], *L. punctata*[2], *L. spicata*[3], and *L. cylindricea*[4]), has been that the white forms never survive longer than about one year after transplantation, though the companion plants of normal color have lived on for a number of years. This experience was borne out by that of Mr. A. C. Edinborough[5] of Baljennie, Saskatchewan, who transplanted the white-flowered form of *L. punctata* to soil similar to that of its native habitat in the Eagle Hills. Apparently, in species of *Liatris* the white-flowered forms merely represent weaker mutants; they are therefore not being given varietal rank.

Apart from the reference to one sweet-scented variety, *Lacinaria scariosa* var. *trilisioides* Farwell (Rep. Mich. Acad. Sci. xvii. 170–171 (1916)), which has not been encountered, only one species, *L. tenuifolia* Nutt., has been reported[6] as noticeably fragrant. Where hundreds and thousands of plants grew the air was said to be "delicately scented, much like that of the *Buddleia* slightly modified, and sufficient to arrest one's attention". The observer noticed that many butterflies and bees had been drawn to the spot and also that the three albino plants found in the region were likewise fragrant.

Fruit. The fruit of *Liatris* is a ribbed, somewhat cylindrical achene, finely pointed at the base, varying in length from ca. 3 mm. in some species to ca. 10 mm. in the largest. In color, as in size, considerable difference can be noted between unfilled fruits and completely matured ones, and therefore care must be taken when giving color from examination of herbarium speci-

[1] Found near Pt. Edward, Lambton Co., Ontario, Aug. 26, 1938, no. 168.
[2] Received from Mr. A. C. Edinborough, Baljennie, Sask. Aug. 24, 1939, no. 202, pl. 1.
[3] Found at Walpole Is., Lambton Co., Ontario, Aug. 26, 1938, no. 166.
[4] Found at Turkey Point, Norfolk Co., Ontario, Aug. 27, 1940, no. 213.
[5] By private communication.
[6] By private communication from Mrs. H. T. Butts, Ormond Beach, Fla. Oct. 1944.

mens. Mostly the mature achenes are of a brown color, but in some species they approach black. The number of ribs was not uniform; in most specimens ca. 10 was the average. In all species the achenes are pubescent along the ribs and more finely and inconspicuously so between the ribs. Though in some cases achenes showed angles, appearing as if developed by close approximation during growth, no specific coordination could be found.

Pappus. One must be careful in stating the color of the pappus, since if not mature, it is colorless, as in *L. ligulistylis*, but purple when mature.

There is considerable difference in the appearance of the pappus of *Liatris* species. In *L. punctata* for instance, the tuft of bristles appears feathery or plumose to the naked eye. Upon closer examination there are found 20–30 setae, from 8–10 mm. in length, with lateral cilia considerably longer than the diameter of the seta, a condition called *setose-plumose* by J. Small, New. Phytol. xvi.–xviii. (1917–1919). The bristles are arranged indefinitely in one to two series. In other species, for example *L. gracilis* Pursh, where there are 30–40 bristles 4–5 mm. long per achene, there is no downy appearance, as the setae have projecting outgrowths about as long as, or only slightly longer than, the diameter of the seta—this called *setose-barbellate* (Small, l. c.). This character was used by Cassini in the division of the genus into three subgenera, two of which, *Suprago* and *Euliatris*, were made sections by DeCandolle; the third is now a separate genus, *Trilisa* DC. These sectional divisions of the genus are here retained.

Though there is never uniformity in the length of all the bristles of an achene, the over-all length of the pappus, obtained by measuring the longest bristles, generally exceeds the length of the achene, and is shorter than, or about equalling, the corolla. In a few cases as in *L. Helleri* Porter, it is only about half the length of the corolla-tube.

KEY TO THE SECTIONS AND SERIES

a. Pappus barbellate, the lateral cilia only 3–6 times the diameter of the seta, so that they are hardly visible without the use of a lens. Section I Suprago (Cass.) DC. . . . b.

b. Heads 3–20-flowered. oblong, with phyllaries mostly erect. . . . c.

c. Inflorescence spicate, the heads mostly sessile: leaves numerous, gradually reduced to bracts subtending the heads; no pilosity within the corolla-tube. . . . d.

d. Phyllaries obtuse, appressed and never recurved.....Spicatae.
d. Phyllaries acuminate and recurved at the tips....Pycnostachyae.
c. Inflorescence loosely spicate or racemose, with sessile or variously peduncled heads; corolla pilose within the tube....e.
e. Phyllaries obtuse, ciliolate; inflorescence frequently panicled; heads 5–15-flowered.....Graminifoliae.
e. Phyllaries lanceolate-acuminate, appressed to the tips, not ciliolate; heads 3–5-flowered.....Pauciflorae.
c. Inflorescence spicate, with the basal rosette of leaves changing abruptly to setaceous bracts; corolla-tube not pilose, but with short hairs on the filaments of the stamens; heads with 3–6 flowers and few loosely erect phyllaries.....Tenuifoliae.
b. Heads 15–70-flowered, hemispheric; the numerous broad phyllaries loosely erect, bullate or partly recurved; corolla pilose within the tube (except in *L. ligulistylis*)....Scariosae.
a. Pappus plumose, the lateral cilia 15 or more times the diameter of the seta, so that these appear plumose to the naked eye. Section II Euliatris (Cass.) DC....f.
f. Heads 4–8-flowered, slender-cylindrical; inflorescence spicate....g.
g. Phyllaries with prolonged petaloid tips; corolla not at all pilose within.....Elegantes.
g. Phyllaries herbaceous and appressed, or with tips only free; corolla quite pilose within the tube.....Punctatae.
f. Heads 15–60-flowered, of more nearly isodiametric-cylindrical proportions; inflorescence loosely cymose to cymose-racemose....h.
h. Phyllaries appressed.....Cylindraceae.
h. Phyllaries recurved or loosely spreading.....Squarrosae.

Description and Classification of the Species

Series I. Spicatae. Mostly glabrous plants with numerous spikes from globular to large-crowned, perennial stocks; leaves linear, gradually diminishing upwards from the long basal ones; heads numerous, 4–18-flowered, 1–1.5 cm. long with phyllaries erect, oblong, mostly obtuse, appressed, never recurved; corolla-tube non-pilose within; achene 4–7 mm. long.—From New York and southern Ontario to South Dakota and Colorado, south to Florida, the Gulf States and New Mexico, with only one species not of moist habitats.

a. Flowering stems stout, 6–15 dm. high; spikes dense; heads 4–18-flowered; phyllaries mostly obtuse....b.
b. Plants with narrowly linear leaves; on moist meadows or in damp woodlands east of the Mississippi.....1. *L. spicata.*
b. Plants with broadly linear leaves; on the bottomlands in the Western Plains States and the mountains of New Mexico.....2. *L. lancifolia.*
a. Flowering stems more flexible, 3–8 dm. high; head 3–6-flowered; phyllaries obtuse, obtuse-mucronulate or acuminate....c.
c. Glabrous plants; corms rounded....d.

d. Phyllaries narrowly oblong, obtuse; leaves narrowly linear, diminishing gradually upwards; more tufted plants with several stems of fewer heads in racemes ..... 3. *L. microcephala.*

d. Phyllaries ovate to lanceolate, acuminate; basal leaves long, narrowly linear, the upper cauline ones abruptly changing to short subulate blades; plants of 1–4 spicate stems ..... 4. *L. acidota.*

c. Hirsute plants; roots elongated and tuberous; spicate; phyllaries oblong and obtuse-mucronulate; from South Florida only ..... 5. *L. Garberi.*

1. Liatris spicata (L.) Willd. Rootstock globose in young plants, enlarged and shallow in old plants by separation of parts permitting considerable vegetative propagation: stems stiff and tall, 6–15 dm. high, glabrous, only rarely hirsute: leaves numerous, linear or linear-lanceolate, glabrous or sparingly hirsute along the veins; lower ones 1–4 dm. long, 5–20 mm. wide, gradually shorter toward the summit of the stem: inflorescence a dense spike 3–7 dm. long: heads subcylindrical, 4–18-flowered, usually sessile along the spike, although basal heads may become peduncled, 8–15 mm. long and 5–10 mm. thick at time of flowering; phyllaries appressed, sometimes glutinous, elliptical-oblong, mostly obtuse but sometimes slightly acuminate, herbaceous, glabrous and having a narrow scarious margin frequently purplish at flowering time; corolla phlox-purple, lacking any pilosity within the tube, 6.5–9 mm. long; achene 4–6 mm. long; pappus 5–7 mm. long, barbellate-setose (not plumose to the naked eye).—Sp. Pl. iii³. 1636 (1803). *Serratula spicata* L. Sp. ii. 819 (1753) (excl. synonomy).

Var. **typica.** A thick-spiked, marsh-loving plant mostly from the more northern latitudes of the range of the species and around mountain lakes and bogs in the southern Appalachian region: stems frequently 5 mm. in diameter at the base and 10–15 dm. tall, glabrous or basally with few scattered hairs: leaves glabrous; the wider basal ones linear-lanceolate, 1 dm. or more long, 5–20 mm. wide: inflorescence usually a dense spike 3–7 dm. long; the heads of 10–18 flowers 1–1.5 cm. long and ca. 1 cm. thick, cylindrical, with an appressed involucre that is sometimes adherent by its glutinous nature; phyllaries glabrous, mostly green or somewhat purplish at time of flowering, with a narrow scarious margin: corolla usually phlox-purple, occasionally white.—*Serratula spicata* L. Sp. ii. 819 (1753), excl. synonyms. *Liatris spicata* Willd. Sp. Pl. iii³. 1636 (1803); Andr. Bot. Repos. t. 401 (1804); Curtis's Bot. Mag. t. 1411 (1811); Sweet, Brit. Fl. Gard. ser. 2, t. 49 (1823); Torr. & Gray, Fl. N. Am. ii. 73 (1841); Torr. Fl. N. Y. 325, t. 47 (1842); Gray, Synop. Fl. i². 111 (1884). *L. macrostachya* Michx. Fl. Bor.-Am. ii. 91 (1803). *L. spicata* β. *macrostachya* DC. Prodr. v. 130 (1836). *L. magnifica* Hort.

Hand-List of Herbaceous Plants Cultivated in the Royal Gardens, Kew 263 (1895), *nomen. L. spicata* f. *albiflora* Britton, Bull. Torr. Bot. Club, xvii. 124 (1890). *Lacinaria spicata* var. *albiflora* Britton, Mem. Torr. Bot. Club, v. 314 (1894) *Laciniaria spicata* f. *albiflora* House, Bull. N. Y. State Mus. 243–4, 69 (1923). *Lacinaria spicata* var. *foliacea* Farwell, Amer. Mid. Nat. ix. 260 (1925).

Moist or marshy land from Long Island, New York, to Florida, and westward to the Mississippi, from the Lake St. Clair region of Ontario and Michigan to the Gulf of Mexico.—MASSACHUSETTS (possible garden escapes). Essex Co.: Lawrence, without collector's name, 1877 (G). Worcester Co.: roadside near Quinsigamond, Sept. 21, 1932, *N. P. Woodward* (G). CONNECTICUT (possible garden escape). Without stated locality, *Hitchcock* (NY). NEW YORK. Albany Co. (possible escapes): sandy plains, near Londonville, Aug. 14, 1937, *H. D. House*, 24958 (G, NY); near Londonville, Aug. 13, 1934, *H. D. House*, [1]21980 (G, NY). Suffolk Co.: White Mills, Long Isl., Sept. 19, 1887, *J. F. Poggenburg* (G). Queens Co.: swamps, Woodhaven, Long Isl., Sept. 14, 1892, *A. Brown* (NY); (albino), Forbell's Landing, Long Isl., Aug. 29, 1890, *G. D. Hulst* (NY). PENNSYLVANIA. Without stated locality: Aug. 1832, *C. J. Moser* (NY). Butler Co.: low field, Aug. 8, 1923, *S. S. Dickey*, 76 (G). Bucks Co.: near Argus, Ridge Valley, Aug. 14, 1923, *C. D. Fretz* (G). Montgomery Co.: thicket in old brick-yard near West Telford, Aug. 23, 1909, *W. M. Benner* (G). Delaware Co.: open woods, Aston Mills, Oct. 16, 1926, *F. W. Pennell*, 13118 (NY). Berks Co.: rather moist soil in a low meadow, 2.4 mis. n. e. of Geigertown, Aug. 1, 1942, *W. C. Brumbach*, 3388 (G); Chester Co.: Oxbow of Octoraro Creek, above Octoraro, Sept. 23, 1928, *F. W. Pennell*, 14607 (NY); Lancaster Co.: without stated locality, Aug. 1858–64, *S. P. Sharples* (G), Sept. 18, 1868, *T. C. Porter* (US). York Co.: McCall's Ferry, Sept. 9, 1893, *A. A. Heller & E. G. Halbach*, 1273 (NY, US); dry woods, McCall's Ferry, Sept. 2, 1898, *A. MacElwee* (US). NEW JERSEY. Without stated locality, *A. Gray* (G), *P. D. Knieskern* (G). Sussex Co.: Franklin Furnace, Aug. 1, 1884, *O. E. Pearce* (US); Aug. 15, 1895, *W. N. Van Sickle* (US). Passaic Co.: Clifton (white form), Aug. 18, 1891, *G. V. Nash* (NY); moist ground along rwy., Newfoundland, Aug. 3, 1893, *W. M. Van-Sickle* (US). Somerset Co.: in rich woods, Watchung, Aug. 8, 1930, *H. Moldenke*, 1358 (NY); in field at edge of woods, on First Mt., Watchung, July 31, 1937, *H. Moldenke*, 9996 (NY); along roadside, in woods, Watchung, Aug. 1, 1924, *H. Moldenke*, 2111 (NY); near Bernardsville, (forma albiflora), Aug. 12, 1890,

[1] A note on this sheet states: "spreading from cultivation", so that it seems probable that when introduced in a favorable location, this species may become naturalized.

Miss A. M. Vail (NY). Middlesex Co.: Perth Amboy, Aug. 25, 1893, *L. H. Lighthipe* (US). Ocean Co.: Bayhead, Barnegat Bay, Aug. 24, 1892, *J. R. Churchill* (G); Bayhead (forma *albiflora*), Aug. 29, 1890, *L. H. Lighthipe* (NY); border brackish marsh, 2 mis. e. of Manahawkin, Aug. 13, 1936, *J. M. Fogg*, 11172 (G). DELAWARE. Newcastle Co.: near Delany's Chapel, Sept. 1899, *W. M. Canby* (G). Kent Co.: Brandywine, 1843, *E. Tatnall* (G). MARYLAND. Baltimore Co.: Catonsville, Aug. 10, 1873, *Morong* (NY), *E. Foreman* (NY). VIRGINIA. Without stated locality: *Dr. Bauer* (NY). Fairfax Co.: (possible escape), near mouth of Difficult Run, Sept. 25, 1909, *F. W. Pennell* (US). Montgomery Co.: Blacksburg, Aug. 3, 1895, *W. A. Murrill* (NY). Giles Co.: Brush Mt., 2 mi. e. of Newport, Aug. 30, 1933, *E. J. Alexander, J. H. Everett, & S. D. Pearson* (NY). WEST VIRGINIA. Hampshire Co.: Millbrook, Aug. 11, 1940, *W. M. Frye*, 154, 157 (NY). Fayette Co.: Nuttall, Aug. 11, 1891, *C. F. Millspaugh*, 1115 (NY); New River, Cotton Hill, July 6, 1929, *W. V. U. Biol. Exped.* (G). NORTH CAROLINA. Buncombe Co.: slopes of Cedar Cliff Mt., Aug. 24, 1897, *Biltmore Herb.*, 579 d (NY, US); Biltmore, Aug. 1894, *Biltmore Herb.* 579 (US). Henderson Co.: Hendersonville, Aug. 22, 1891, *J. D. Smith* (G, US). Transylvania Co.: Green Knob in Pisgah Forest, Aug. 1908, *H. D. House*, 3682 (G). SOUTH CAROLINA. Kershaw Co.: Camden, July 27–28, 1906, *H. D. House*, 2658 (NY, US). Beaufort Co.: Beaufort district, 1882, *J. H. Mellichamp*, 399 (US); Bluffton, 1886, *J. H. Mellichamp*, 9, 10 (US); GEORGIA. Catoose Co.: Chickamauga Creek, near Springgold, Aug. 6–12, 1895, *J. K. Small* (NY, US). Dade Co.: along C. &. D. Rwy., Lookout Mt., July, 1898, *A. Ruth*, 675 (NY); Lookout Mt., July, 1898, *A. Ruth*, 658 (US). Richmond Co.: Augusta, 1832, *Drummond* (G). Sumter Co.: sandy bog, Aug. 26, 1896, *R. M. Harper* (NY). Colquitt Co.: moist pine barrens, between Moultrie & Kingwood, Sept. 22, 1902, *R. M. Harper*, 1652 (NY). FLORIDA. Without stated locality, *ex. Herb. Chapman*, Columbia College (NY). Franklin Co.: Apalachicola, Aug. 20, 1872, *Biltmore Herb.*, 579 b (G). Bay Co.: open sandy moist ground, Lynn Haven, Oct. 12, 1911, *C. Billington*, 168 (US). Walton Co.: boggy places, in pine barrens, Argyle, Oct. 2, 1901, *A. H. Curtiss*, 6923 (G, NY); moist soil, in pine barrens, Crestview, April 21, 1899, Biltmore Herb., 579 a (US). Orange Co.: flatwoods, Vineland, Oct. 17, 1929, *F. Vasku & E. West* (NY). ONTARIO. Lambton Co.: meadows, Squirrel Isl., *O. A. Farwell*, 7103 (G, isotype of *Lacinaria spicata* var. *foliacea*); Sarnia, Aug. 11, 1894, *C. K. Dodge* (G, Ot); borders of marshes, Pt. Edward, R. St. Clair, Aug. 11, 1884, *J. Macoun* (G, Ot); marshes, Pt. Edward, Aug. 12, 1901, *J. Macoun*, 26616 (NY, Ot); meadows on Squirrel

Isl., Sept. 3, 1924, *O. A. Farwell*, 7102 (G). Essex Co.: Sandwich, July 27, 1901, *J. Macoun* (G, NY); damp thickets, Sandwich, Aug. 4, 1892, *J. Macoun*, 22751 (G, NY, Ot); near Mineral Springs, Windsor, July 31, 1894, *A. W. Cody* (Q). MICHIGAN. Tuscola Co.: near shore of Lake Huron, 9 mis. e. of Bay City, Aug. 3, 1940, *H. A. Gleason*, 9913 (NY). Kent Co.: Grand Rapids, Aug. 3, 1886, *A. A. Crozier* (US, ND). St. Clair Co.: banks of Governmental Canal, Lake St. Clair, July, 1893, *T. Morong* (NY); Port Huron, *C. K. Dodge*, Aug. 6, 1896 (G); Aug. 11, 1894 (NY); Fort Gratiot (within Port Huron), 1829, *Dr. Pitcher* (NY). Oakland Co.: near Lake Orion, Aug. 3, 1913, *B. F. Chandler* (US). Washtenaw Co.: low marshy meadow, 1.3 mis. e. of Dexter, Aug. 20, 1937, *F. J. Hermann*, 9141 (G, NY, US). Jackson Co.: Watkins Station, Aug. 4, 1892, *C. F. Wheeler* (US); low ground, 10 mis. s. of Jackson, Aug. 24, 1906, *S. H. Camp* & *D. R. Camp* (US); without stated locality, Aug. 12, 1896, *S. H. Camp* & *D. R. Camp* (US). Kalamazoo Co.: swampy soil, n. of Pawpaw Lake, Texas twsp., July 23, 1930, *C. R. Hanes* (NY); n. of Pawpaw Lake, the "Mud Hole" ½ mi. s. e. of Vicksburg, Aug. 8, 1940, *F. W. Rapp*, 3625 (NY). OHIO. Erie Co.: Castalia prairies, Aug. 7, 1895, *E. L. Moseley* (US). Lucas Co.: Dorr St., Toledo, Aug. 4, 1920, *E. L. Moseley* (G). Lorain Co.: Lorain to Huron, Aug. 24, 1924, *R. J. Webb*, 5476 (G), Aug. 24, 1924, *R. J. Webb* & *G. A. Cook*, 1612 (G). Stark Co.: south swamp, Canton, Aug. 1912, June 25, 1912 (No. 13) *Mrs. F. E. Case* (US). Champaign Co.: without stated locality, Aug. 9, 1893, *W. C. Werner* (NY). Pickaway Co.: Kibler's bog, ½ mi. s. of Circleville, July 28, 1936, *Bartley & Pontius*, 39 (NY). Montgomery Co.: Dayton, Aug. 15, 1881, *A. Foerste* (US). Ross Co.: Frankfort (some white), Aug. 9, 1935, *D. Demaree*, 11496 (G, US). INDIANA. Co. undetermined: low ground, e. of Chicago, Aug. 30, 1891, *W. S. Moffatt*, 1627 (US). Lake Co.: moist prairie ¼ mi. n. of Griffith, Aug. 29, 1916, *C. C. Deam*, 21324 (US); moist prairie ditch, ¼ mi. n. of Griffith, Aug. 29, 1916, *C. C. Deam*, 21330 (US); Hammond, old beaches "Lake Chicago", Sept. 14, 1909, *E. S. Steele*, 147 (G, US); Buffington to Pine, old beaches "Lake Chicago", Sept. 20, 1909, *E. S. Steele*, 181 (G); open place in oak woods, ½ mi. n. of Griffith, Aug. 29, 1916, *C. C. Deam*, 21342 (US); Whiting, Aug. 29, 1893, *N. L. Britton* (NY); dry sands, Pine, Aug. 31, 1895, *L. M. Umbach* (US); low sands, Pine, Aug. 27, 1897, *L. M. Umbach* (US); swales, Pine, Aug. 19, 1898, *L. M. Umbach* (US). Noble Co.: low sandy and marl border, Eagle Lake, Sept. 14, 1916, *C. C. Deam*, 21889 (US). Marshall Co.: Lake Maxinkuckee, July 12, 1899 (No. 731), July 28, 1899 (No. 848), *B. W. Evermann*, (US); near Lake Maxinkuckee, 1900, *J. T. Scovell & H. W. Clark*, 1430 (NY, US), Aug. 26, 1900, *J. T. Scovell & H. W.*

Clark, 848 (NY); Plymouth, Sept. 21, 1909, *H. W. Clark* (US). Starke Co.: low sandy border, s. e. side of Bass Lake, Aug. 22, 1916, *C. C. Deam*, 21084 (US); open places in sandy woods, s. e. side of Bass Lake, Aug. 22, 1916, *C. C. Deam*, 21038 (US); sandy soil, Sept. 28, 1940, *C. M. Elk* (NY). Newton Co.: fallow sandy field, 5 mis. n. & 1 mi. w. of Enos, July 27, 1940, *R. C. Friesner*, 14697 (NY). Tipton Co.: w. of Goldsmith, Aug. 2, 1913, *Mrs. C. C. Deam*, 13921 (G, US); along the right of way of Erie Rwy., ½ mi. w. of Goldsmith, Sept. 3, 1914, *C. C. Deam*, 15362 (NY). ILLINOIS. McHenry Co.: (albino), McHenry, Aug. 23, 1935, *H. C. Benke*, 5760 (G). Cook Co.: Chicago, *H. H. Babcock*, 1860, *Dr. Scammon* (NY, US); South Chicago, 76th & Stoney Isl., Aug. 4, 1913, *H. H. Smith*, 5737 (G); waste places, Chicago, Aug. 16, 1897, *L. F. Ward* (US); in vacant lot, Chicago, Sept. 2, 1893, *L. F. Ward* (US); near Pullman, Aug. 27, 1893, *G. B. Sudworth* (US); W. Pullman, near 119th St., Aug. 8, 1907, *J. M. Greenman*, 1972 (G); along rwy., Lake Villa, Aug. 10, 1906, *H. A. Gleason & F. D. Shobe*, 243 (G); wet intervals, old beaches, Indiana Harbor, Sept. 15, 1909, *E. S. Steele* 148 (US); Cicero, July 20, 1896, *Mrs. A. Chase* (NY); Riverdale, Aug. 1909, *J. M. Greenman*, 2866 (G, US); vacant lot, Evanston, July 4, 1911, *E. E. Sherff* (US); Morgan Park Ridge, Sept. 8, 1907, *R. A. Dixon & C. A. Gage*, 789 (US, Q). KENTUCKY. Calloway Co.: between Murray & Pine Cliff Ferry, July 23, 1937, *L. B. Smith & A. R. Hodgdon*, 4202 (G, NY, US). TENNESSEE. Robertson Co.: rocky hills, Aug. 19, 1897, *H. Eggert* (NY). Dickson Co.: dry oak barrens, Burns, Aug. 17, 1939; *H. K. Svenson*, 10485 (B). Cocke Co.: 3 mis. w. of Wolf Creek Sta., Aug. 30, 1897, *T. H. Kearney*, 746 (NY). Cumberland Co.: Mayland, Aug. 16, 1934, *Porter & Harbison*, 3059 (NY). Van Buren Co.: grassy swamps, between Spencer & Cagle, Aug. 1938, *H. K. Svenson*, 9678 (B). Coffee Co.: oak barrens n. of Manchester, Aug. 6, 1938, *H. K. Svenson*, 8959 (G, B); swamp, 2 mis. s. of Manchester, Aug. 18, 1940, *H. K. Svenson*, 10606 (B); low fields, near Tullahoma, Aug. 10, 1899, Biltmore Herb., 579c (NY, US); dry oak barrens, Tullahoma, Aug. 24, 1930, *H. K. Svenson*, 4231 (G, P, B). Chester Co.: borders of thickets, 1892, *S. Bain* (US); fields, Henderson, *S. M. Bain*, June, 1892 (No. 81) (NY), Aug. 1892 (No. 81) (G). Franklin Co.: wet places in oak barrens, between Tullahoma & Estill Springs, Aug. 13, 1939, *H. K. Svenson*, 10490 (B). ALABAMA. Without stated locality: *M. Lea* (G). Hale Co.: dry chalky prairies, 1 mi. n. w. Rosemary, Aug. 23, 1934, *R. M. Harper*, 3254 (G, NY, US). Lee Co.: Auburn, Aug. 11, 1897, *F. S. Earle & C. F. Baker*, 1160 (NY). Butler Co.: grassy pine barrens, near Bolling, Aug. 28, 1885, *J. D. Smith*, 427 (US). Henry Co.: dryish swamp border, 8 mis. n. of Headland, Aug. 10, 1927, *K.*

M. Wiegand & W. E. Manning, 3174 (G). MISSISSIPPI. Wayne Co.: Waynesboro, Aug. 8–9, 1896, *C. L. Pollard* 1248 (G, NY, US, ND). Jackson Co.: Ocean Springs, Aug. 14, 1889, *Herb. F. S. Earle* (ND). Harrison Co.: Biloxi, Aug. 23, 1898, *S. M. Tracy* 4886 (NY). WISCONSIN. Kenosha Co.: Pleasant Prairie, 3 mi. south of Kenosha, Aug. 7, 1941, *E. P. Kruschke*, K-41-175 (G), K-41-179 (G) (albino). MISSOURI (possible garden escape). St. Louis Co.: St. Louis, July 7, 1910, *E. E. Sherff*, 288 (G). LOUISIANA (possible garden escapes). Rapides Co.: Alexandria, *J. Hale* (G). Orleans Co.: New Orleans, 1835, *Dr. Ingalls* (NY).

(To be continued)

Betula glandulosa at a low Altitude in New Hampshire. —While vacationing in Jackson, N. H., in late September, a few years ago, we drove up the Black Mountain Road, turning right, near Whitney's, into the Dundee Road. After a short way we parked our car in front of a house, on the right side of the road—a house which we used to call "the house with the chimney outside." We walked through the yard, past the house and barn, and went a short distance into an open upland meadow-like pasture, to enjoy the view. This location was on the lower north-east slope of Tin Mountain, possibly 400 feet below the summit, which is only 2025 feet.

As we sat there, I examined the low growth around me, and saw, to my great amazement, what looked exactly like *Betula glandulosa*, which I had never collected before except in the alpine region of the Great Range. However, Professor Fernald has identified the specimens I sent him and this establishes, evidently, an exceptionally low altitude for *B. glandulosa*.—Charlotte Endicott Wilde, Canton, Massachusetts.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXII.

IDENTIFICATIONS AND REIDENTIFICATIONS OF NORTH AMERICAN PLANTS

M. L. Fernald

(*Continued from page 162*)

Habenaria psycodes (L.) Spreng., forma **varians** (Bryan), stat. nov. Var. *varians* Bryan in Ann. Mo. Bot. Gard. iv. 37, pl. 5, fig. B (1917).

H. fimbriata (Ait.) R. Br., forma **mentotonsa,** f. nov., labelli lobo terminali cuneato integro vel apice breviter eroso-dentato; petalis integris.—Maine: meadow, Hamilton Cove, Lubec, Washington County, August 2, 1909, *Fernald*, nos. 1662d (type in Herb. Gray.), 1662e and 1662g.

Quite like typical *Habenaria fimbriata* but with entire petals and narrowly cuneate entire or obscurely short-dentate or erose terminal division of the lip. Entire petals are frequent in both *H. fimbriata* and the smaller-flowered *H. psycodes*, and the lip of *H. psycodes*, forma *ecalcarata* (Bryan) Dole is entire. At Hamilton Cove *H. fimbriata*, forma *mentotonsa* (with shaved chin) is relatively common, mixed with typical *H. fimbriata*, but I cannot follow Correll who, in Bot. Mus. Lfls. Harv. Univ. vii. 65 (1938), calls this plant the characteristic slender-racemed one with greenish-white or rose-tinted flowers, the hybrid of *H. lacera* (Michx.) Lodd. and *H. psycodes*, the always scanty and relatively insignificant plant known as × *H. Andrewsii* Marcus White ex Niles, Bog-Trotting for Orchids, 258 with plate (1904).

Correll's vast aggregation of relatively typical *Habenaria psycodes*, *H. fimbriata* and *H. lacera*, var. *terrae-novae* Fern. in Rhodora, xxviii. 21 (1926) under the unsatisfactorily blanketing name × *H. Andrewsii* can appeal to no field-botanist who for decades has known the various elements involved. Much Newfoundland *H. lacera*, var. *terrae-novae* is included under his remodeled × *H. Andrewsii*, although no true *H. lacera* is found in Newfoundland, where its smaller-flowered var. *terrae-novae* occurs by thousands on boggy barrens, tundra and treeless alpine areas, almost always apart from *H. psycodes* of richer, often alluvial, thickets and meadows. On Sable Island, 100 miles out-to-sea off

Canso, Nova Scotia, the only Fringed-orchid is *H. lacera*, var. *terrae-novae*.

Very similarly, although *Habenaria fimbriata*, forma *mentotonsa* occurs in eastern Washington County, Maine, it is significant that in the many pigeonholes of Fringed-orchids in the Herbarium of the New England Botanical Club I can find neither *H. lacera* nor *H. psycodes* (parents of true × *H. Andrewsii*) from that county. Both seem to stop their eastern extension in coastwise Maine in Hancock County, 70–90 miles to the southwest of Cutler.

Similarly, nine tenths of the specimens in the Gray Herbarium and that of the New England Botanical Club which have been annotated (some of them cited) as × *Habenaria Andrewsii* are characteristic *H. fimbriata* (including the TYPE of *H. fimbriata*, forma *albiflora* Rand & Redfield) or *H. psycodes*. × *H. Andrewsii*, as well as Fleur-de-lis, Blackberry blossoms, Yellow Clintonia, Indian Pipes, "white, innocent twigs of apple" and other non-orchidaceous plants, was illustrated in Bog-Trotting for Orchids. The life-size photograph shows racemes 2–2.5 cm. thick; and the description calls for "Labellum about ⅓–½ inch [8–12.5 mm.] broad". In his very detailed account of *H. psycodes* × *lacera*, Andrews, in RHODORA, iii. 246 (1901), said: "Lower leaves as in *H. lacera* . . . , width to 3 cm. . . . Average width of lip about 12 mm. . . . cleft as in *H. lacera* . . . Glands of pollen-masses . . . elliptical or slightly kidney-shaped", and, on p. 247, "All in all the characteristics of the hybrid seem to show a stronger influence of *H. lacera*". The distinctive characters of *H. lacera* and of *H. fimbriata*, besides color and dissection of lip, include the following. H. LACERA: largest lower leaves 1–3.5 cm. broad; raceme 2–6 cm. thick; perianth 5–6 mm. long; lip 1–1.5 cm. long and broad, its terminal division cuneate into a very slender claw; glands of anther oblong-linear. H. FIMBRIATA: largest lower leaves 2.5–9 cm. broad; raceme 5–9 cm. in diameter; perianth 9–12 mm. long; lip 1.5–2 cm. long, 1.8–3 cm. broad, its dilated terminal division short-stalked or subsessile; glands suborbicular. In all except the narrow and fringeless terminal division of its lip *H. fimbriata*, forma *mentotonsa* is very characteristic *H. fimbriata*, growing, as said, far from *H. lacera* or *H. psycodes*. In view of these many considerations it is toler-

ably certain that the great group of amateur and professional botanists who have assembled the large representation of *H. lacera, psycodes* and *fimbriata* in the herbarium of the New England Botanical Club and in the Gray Herbarium, for the most part with correct identifications, have not all been wrong.

Cleistes divaricata (L.) Ames, var. **bifaria,** var. nov. (tab. 1048), var. typica recedit planta plerumque 1.5–5 dm. alta pedunculo 0.3–1.6 dm. longo; sepalis longioribus 3–4.5 cm. longis; petalis 2–3 cm. longis, 5–10 mm. latis.—Upland woods, mountain-crests and slopes, Cumberland Plateau and Mountains of Kentucky and Tennessee and Blue Ridge of western North and South Carolina, coming out to peats and pine barrens of the Coastal Plain from eastern North Carolina to Florida, thence to Louisiana. Map 2.[1] Type from summit of Table-rock Mountain, Burke Co., North Carolina, July 2, 1891, *Small & Heller*, no. 285 (Gray Herb., isotypes in several other herbaria).[2]

Arethusa divaricata L. Sp. Pl. 951 (1753), typonym of *Cleistes divaricata* (L.) Ames, Orchidaceae, vii. 21, pl. 108 (1922), was based on *Serapias radicibus palmato-fibrosis, caule unifloro* of Gronovius from Virginia (photograph before me) and upon Catesby's plate 58 of his *Helleborine Lilii folio caulem ambiente*, etc., represented as having an extraordinarily large flower (with sepals 6.4–7.3 cm. long, petals 6–7 cm. long and lip 7 cm. long). The Clayton material, shrunken by drying, is more modest, its dried and distorted sepals up to 4.2 cm. long, petals to 3.6 cm. and lip slightly over 4 cm. long. The Clayton material represents a small-flowered extreme of the plant which locally follows the Coastal Plain from southern New Jersey to northern Florida (map 1). The Catesby drawing is presumably exaggerated in size. I have had through the courtesy of the Curators the advantage of studying, besides that in the Gray Herbarium and the Ames Herbarium, all the material at the United States National Herbarium, the New York Botanical Garden, the Academy of Natural Sciences of Philadelphia and the Brooklyn Botanic Garden. These collections show that there are two

[1] Since the map was engraved, specimens from additional stations in the Cumberland Mountains of Tennessee have been sent me for study by Professor Jesse M. Shaver of George Peabody College for Teachers, at Nashville. They add three dots for Tennessee.

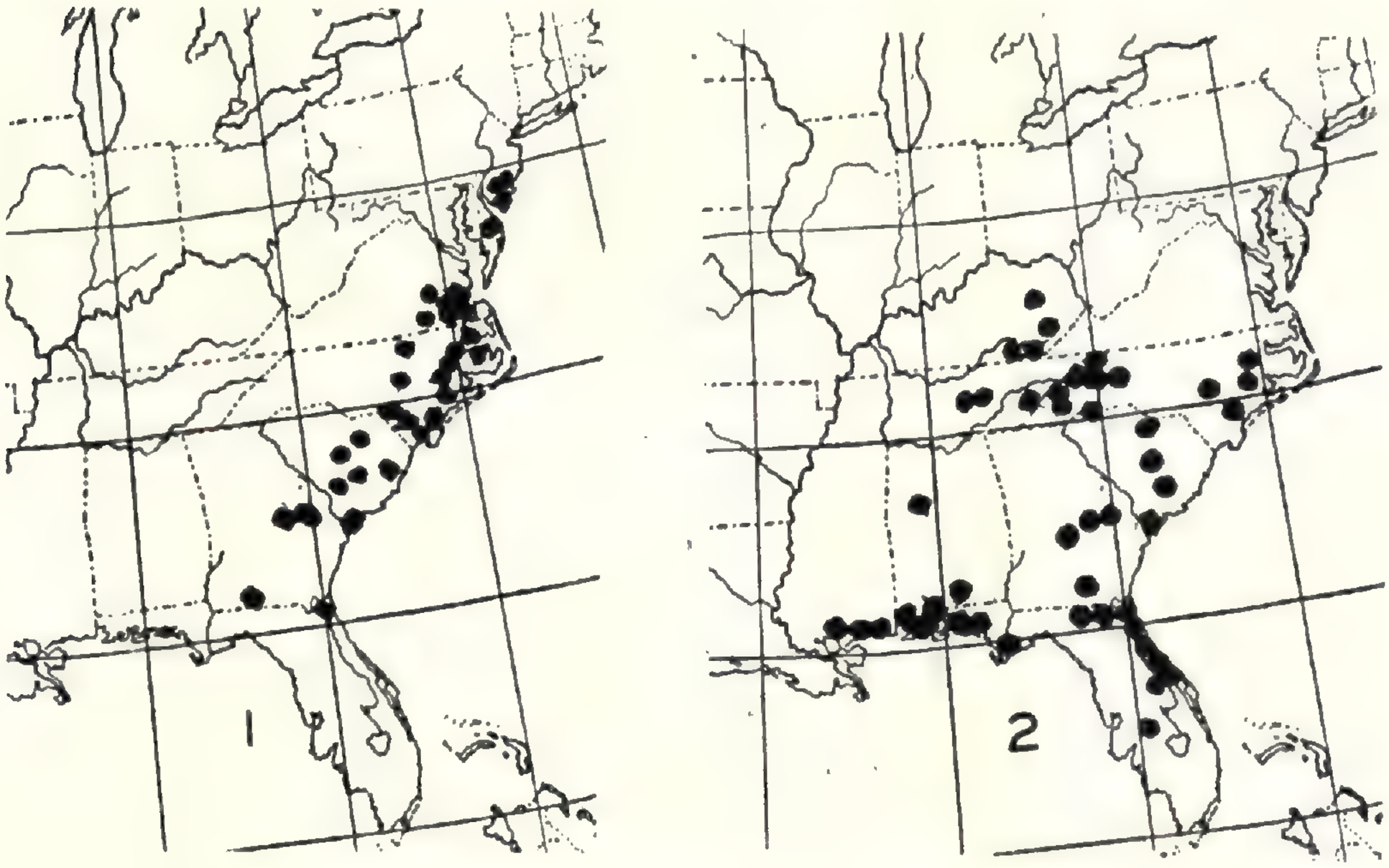
[2] One Florida specimen of 1888, bearing the intriguing data, "wedding trip", has not been entered on the map; neither have I selected it as the type of var. *bifaria* (*in two parts* or *on two sides*).

Photo B. G. Schubert

CLEISTES DIVARICATA, all figs. × 1: FIGS. 1 and 2, median leaf and flower from eastern Virginia (type-region); FIG. 3, flower from southern New Jersey.

Photo B. G. Schubert

CLEISTES DIVARICATA, var. BIFARIA, all figs. × 1: FIG. 1, upper half of plant from TYPE-series; FIGS. 2 6, flowers from various localities.



MAP 1, Range of typical CLEISTES DIVARICATA; MAP 2, of var. BIFARIA.

rather strongly defined varieties passing as *Cleistes divaricata*. The plant which is confined to the Coastal Plain, northward to southern New Jersey but in the South not found west of northern Florida, seems to be true *C. divaricata*. This plant (our PLATE 1047) in its best development is usually 4 or 5 dm. high, the whole series ranging from 2.2–7.2 (av. 4.5) dm. high, while the peduncle (between the base of the median leaf and the floral bract is 0.9–2 (av. 1.5) dm. long. The median leaf ranges from 6.5–15 (av. 10) cm. long; the lateral sepals 4–7 cm. long; petals 3.5–5 (by Catesby shown up to 7) cm. long and 8–14 mm. broad; the ovary and stipe during anthesis 2.5–4.5 (av. 3.25) cm. long.

Throughout much of the Southeast, from Florida to eastern North Carolina, west to Louisiana, chiefly on the Coastal Plain, and inland on the Blue Ridge (up to open summits) to North Carolina and on the Cumberland Plateau and Mountains of Tennessee and Kentucky, the plant is generally smaller in most parts, var. *bifaria* (from its two areas of development). In var. *bifaria* (PLATE 1048) the stem is rarely 6.5 dm. high, usually ranging from 1.5–5 dm., with the peduncle 0.3–1.6 (av. 1) dm. long and the median leaf 3.5–13 (av. 7.6) cm. long. Its flower is conspicuously smaller, though sometimes approaching that of var. *typica*, with longer sepals 3–4.5 cm. long, petals only 2–3

cm. long and 5–10 mm. wide, and ovary and stipe during anthesis 1.2–3.5 (av. 2.6) cm. long.

Occurring on the ancient Cumberland Mountains and Plateau and along the ancient Blue Ridge, var. *bifaria* seems to be the biological type of the species, which, on withdrawal of the Cretaceous and then the Tertiary seas from the country to the east and south, largely moved out to the Coastal Plain. There, in new environment, it has given rise to the larger-flowered extreme (nomenclatural type of the species) which has followed locally northward to southern New Jersey.

As indicating the confusion heretofore of typical *Cleistes divaricata* of the Atlantic Coastal Plain and var. *bifaria* of the southern Atlantic and the Gulf Coastal Plain, as well as the mountains, there is a sheet in the Britton Herbarium, originally in the herbarium of the late Professor Lewis R. Gibbes of the College of Charleston, South Carolina, labeled in the hand of Dr. John K. Small as from "Flat Rock, S. C.". This original label, which, like all original labels, would never be altered or written upon by those who fully respect original documents, was unfortunately altered by a later botanist, who knew the Carolina Mountains, to "N. C." instead of the original S. C., and the original label further desecrated by the misinformative addition "Henderson Co., N. C.". The specimen is of typical Atlantic Coastal Plain *C. divaricata*, which is apparently unknown in Henderson County or elsewhere on the Blue Ridge or on the Cumberland Plateau or Mountains. In view of the fact that Gibbes lived at Charleston and that there is another sheet of material with his original handwriting on the labels (one "Summerville, 20 May, 1859", the other "Flat Rock, 12 June, 1858. L. R. G.") it would seem that the specimen with unjustifiably altered label came from Flat Rock on Flat Rock Creek, which drains into Wateree River, a tributary of Santee River, in Kershaw County, on the Coastal Plain of South Carolina, north of Camden and northwest of Sumter and Charleston.

Calopogon pulchellus (Salisb.) R. Br., var. **latifolius** (St. John), stat. nov. Forma *latifolius* St. John in Proc. Bost. Soc. Nat. Hist. xxxvi. 69, pl. 1, fig. 4 (1921). *Limodorum tuberosum*, f. *latifolium* (St. John) House in Bull. N. Y. State Mus. no. 243–244: 51 (1923), as to name only. *Cathea pulchella*, f. *latifolia* (St. John) House, l. c. no. 254: 244 (1924), as to name only.

The original material is much more than a broad-leaved extreme of *Calopogon pulchellus*, a species which, even in the same area, may have the leaf varying from narrowly linear and only 2–4 mm. wide up to lanceolate or lance-oblong and up to 2 cm. wide, while very extreme and gigantic plants (up to 9.75 dm. high), may have the leaf up to 3–5 cm. broad. In this typical *C. pulchellus*, either very narrow- or very broad-leaved, the leaf is usually solitary and much shorter than the elongate scape. The type of var. *latifolius* has the leaves often paired and broadly lance-oblong to narrowly oblong-ovate, only twice to six times as long as broad and greatly overtopping the very short scape, while its heavily dark-coated tuber is much larger (2 cm. thick) than in any typical *C. pulchellus* I have ever seen. The type is past flowering, but other material, also from Sable Island, is flowering. This is narrower-leaved and has either paired or single leaves, although its scape is much shorter than to barely overtopping the leaf or leaves; furthermore, some material from the Magdalen Islands is stongly transitional to var. *latifolius*. This plant of Sable Island and, less typically, of the Magdalen Islands is not the Newfoundland *Limodorum tuberosum*, var. *nanum* Nieuwland in Am. Midl. Nat. iii. 130 (1913). The latter is merely typical *Calopogon pulchellus* at its bleak northern limit, 0.7–2 dm. high, with scape much overtopping the leaf, the raceme reduced to 1–4 flowers, merely the smallest extreme of the species, just as plants of southeastern Virginia 6–9.75 dm. (pretty close to 1 m.) high, with the leaf 3–5 cm. broad and the 10–20 flowers 4–4.5 cm. broad, are the largest. The paired and short leaves and the large tuber of the type of var. *latifolius* give the plant (past flowering), as shown in St. John's figure, the aspect of *Liparis!*

SPIRANTHES TUBEROSA Raf., var. **Grayi** (Ames), comb. nov. *S. Grayi* Ames in RHODORA, vi. 44 (1904). *S. simplex* Gray, Man. ed. 5: 506 (1867), not Griseb. Fl. Brit. W. Ind. 641 (1864).

As noted by me in RHODORA, xlviii. 6 and 10 (1946), the name *Spiranthes tuberosa* Raf., Herb. Raf. 45 (1833) antedates by seven years the name *S. Beckii* Lindley (1840), the latter name currently used for the very slender and tiny-flowered plant which Ames correctly, except for the overlooked *S. tuberosa*, named *S. Grayi* in 1904. It is fortunate, at least, to be able to dismiss the

name *S. Beckii*, for Lindley made a sad mess of his original publication of it in his Genera and Species of Orchidaceous Plants, 472 (Sept. 1840). There, in the fashion of many British botanists of his day (and too often of the present day), he chose the British use of the name *S. gracilis*, rather than the earliest use of it. Consequently, he took up *S. gracilis*, as of Hook. (we now would say *sensu* Hook.), Fl. Bor.-Am. ii. 202, t. 203 (1839), with the synonymy copied directly from Hooker. Hooker mis-cited the combination as starting in Bigelow, Fl. Bost. ed. 2: 322 (1824), Bigelow having called it *Neottia gracilis*. Hooker cited his *S. gracilis* (Bigel.) Hook. as having the "Hab. Canada; and Lake Huron (*Dr. Todd*) to Fort Franklin, on the Mackenzie River. *Dr. Richardson. Drummond*" and his plate beautifully showed the Canadian *S. lacera* (Raf.) Raf., l. c. 44 (1833), discussed and illustrated by me in Rhodora, l. c. 5–9, pl. 993 (1946). Lindley, maintaining *S. gracilis* sensu Hooker (1839), assumed that Drummond, who actually explored northward to northern Canada, had collected it much farther south, consequently he interpreted the Drummond citation given by Hooker as meaning "Louisiana", then for good measure he added "etiam in Bahamis"! *S. gracilis* (Bigelow) Beck, Bot. 333 (1833) and *S. gracilis* (Bigelow) [sensu] Hooker (1839), although two different species so far as the plants are concerned, both go back nomenclaturally to the same type.

Having thus temporarily saved the name *Spiranthes gracilis* sensu Hooker (1839), Lindley's next problem was to dispose of the earlier *S. gracilis* (Bigelow) Beck (1833). That was quickly accomplished by renaming the latter *S. Beckii* Lindl. l. c. (1840), with the additional synonyms *Neottia tortilis* [sensu] Elliott (1822) [not Swartz (1800)], and *Limodorum praecox* Walt. (1788) basis of *S. praecox* (Walt.) S. Watson (1890). Nomenclaturally alone the name *S. Beckii* Lindl. is doubly illegitimate. If it was, as he said, the same as the earlier *S. gracilis* (Bigelow) Beck he should have used the latter name for it; if, however, it was also the same as *Limodorum praecox* Walt. (1788) Lindley should have retained this specific name. Taxonomically, furthermore, *S. Beckii* Lindl. was as hopeless a muddle as could be imagined, for it was concocted from elements of several different species. *Limodorum praecox* Walt., originally described with fibrous roots

and ensiform leaves ("radicibus fibrosis, foliis ensiformibus") etc., is a plant with long and mostly linear firm leaves extending up the stem, the relatively coarse spike with heavily pubescent rachis, bracts and ovaries, the perianth 4–6 mm. long, etc., the perianth of *S. tuberosa* being only 2–3 mm. long. Nevertheless, Lindley described his *S. Beckii* as "perfectly glabrous. The flowers are very minute . . . S. glaberrima, foliis omnibus radicalibus anguste ovalibus" etc. If, furthermore, it were *N. tortilis* sensu Elliott, it would be very difficult to reconcile Lindley's description with Elliott's "foliis radicalibus linearibus . . . *Stem* pubescent towards the summit. *Leaves* . . . of the root linear lanceolate, nine to ten inches long . . . Bracteal leaves pubescent" etc. In view of the vertical, finger-like, usually solitary tuber of *S. tuberosa* ("*S. Beckii*" of most recent authors) it is illuminating that Lindley knew nothing of this character nor did those authors with whose descriptions he associated his name. Furthermore, since his *S. Beckii* was "perfectly glabrous" as is *S. tuberosa*, it is significant that Lindley said in his Latin diagnosis "ovario puberulo", a character belonging to *S. praecox*. The "lip [with] . . . a remarkably lax cellular texture" applies to *S. tuberosa*, but the description and cited synonyms otherwise are so confused that it is certainly fortunate that the name given by Lindley is illegitimate.[1]

Spiranthes tuberosa consists of two strongly marked geo-

[1] Hooker, under his *Spiranthes gracilis* (i. e. *S. lacera*), a plant with glabrous inflorescence, and which Hooker correctly described "foliis radicalibus ovatis petiolatis", cited as synonyms the much earlier *Ophrys aestivalis* Michx. Fl. Bor.-Am. ii. 157 (1803) and *Neottia tortilis* Pursh, Fl. Am. Sept. ii. 589 (1814), "(*non Sw.*)". Lindley, under *Spiranthes gracilis*, cited the same synonyms. Evidently neither he nor Hooker studied very closely the Michaux description [and specimens] nor the description by Pursh; otherwise they would not have cited them under the wholly glabrous *S. gracilis*, with leaves all basal and ovate, for Michaux definitely described his *Ophrys aestivalis:* "O. scapo folioso: foliis glabris, lanceolatis, acutissimis; spica pubescente, spirali" etc. and he suspected that it might be the *Limodorum praecox* of Walter, *O. aestivalis* occurring "a Pensylvania ad Carolinam". The type of *Ophrys aestivalis*, a species which I do not find accounted for in recent American literature, as shown in one of Cintract's photographs before me, consists of two full plants, with linear-lanceolate leaves extending up the stem, the longer blades about 2 dm. long, the slightly spiraling to secund spike with perianths 6 mm. long. Mounted with these two plants is a broken-off spike of *Spiranthes cernua*, which obviously was an inadvertent addition made by the mounter. *Ophrys aestivalis* Michx. (1803) is *Spiranthes vernalis* Engelm. & Gray (1845). Most fortunately, we do not have to displace the latter name, for there is an Old World *Spiranthes aestivalis* Richard (1818).

As to Pursh's misidentification of *Neottia tortilis*, we need not here go into details, except to note that Pursh included under it *Ophrys aestivalis* Michx., gave the same range as the latter, and described the leaves as *linear*. Enough said!

graphic variations. Essentially all the material in the Gray Herbarium and that of the New England Botanical Club from New England, forty-five collections, has a relatively close spike with closely spiralling and often crowded and overlapping flowers, as in the type of *S. simplex* Gray, not Grisebach. This plant varies from 0.7–3 dm. (farther south to 4.5 dm.) in height, and its vertical tuber is thick and finger-like, usually solitary. This, as said, is the plant described by Gray as *S. simplex* and correctly renamed by Ames *S. Grayi*. All the material in the Gray Herbarium from the southernmost states, from Florida to eastern Texas, north to South Carolina, has the spike strongly secund, without or with few spiral twists in the rachis and the relatively few flowers distant and not overlapping. From North Carolina to New Jersey both variations, with some transitions, occur, the plant often reaching a height of 5.25 dm., while its roots are usually more slender and not infrequently 2 or even 3. This is true *S. tuberosa* Raf. which was described with "spic. gracilis vix spiralis secunda . . . pedal."

Dr. Schubert has made dissections of flowers from several specimens of each extreme and, while each series shows some variation in the degree of toothing and shape of the lip, there appears to be nothing constant except the relatively dense and strongly spiralling spike and usually thicker tuber to separate var. *Grayi* from the usually more southern typical *S. tuberosa*.

Gray's *Spiranthes simplex*, type of *S. Grayi* and of *S. tuberosa*, var. *Grayi*, had "scape . . . bearing a small narrow (rarely 1-sided) spike of *very short flowers* (perianth 1″–1½″ long)". It came from "E. Mass. (Nantucket, *Dr. Robbins*), New Jersey (*C. F. Austin*, &c.), and Delaware, *Wm. M. Canby*." Gray's original sheet contains the Nantucket material from *Robbins*, which is the dense-spiked *S. tuberosa*, var. *Grayi;* a series of six quite similar plants collected by himself ("&c.") in the pine barrens of New Jersey (the *Austin* material evidently not retained by him), and three characteristic plants (one of them misplaced by the mounter) with the "rarely 1-sided" spike from *Canby*, but marked as from "Salisbury, Maryland" (not "Delaware"), this *Canby* material being of typical *S. tuberosa*.

CORALLORHIZA, NOT CORALLORRHIZA.—From the first edition of Gray's Manual (1848) through the 6th edition (1890) the saprophytic woodland Coral-roots were rightly called *Corallorhiza*, although the genus was ascribed to Haller, whose definition of it was prior to 1753, in his Enum. Meth. Stirp. Helvet. i. 278 (1742), Haller, who went back to Ruppius, then spelling the generic name *Corallorhiza*. In the 7th edition of Gray's Manual (the *Orchidaceae* revised by Professor Oakes Ames) Haller was bracketed as the author prior to 1753, the post-Linnean author given as Robert Brown; and the spelling was changed to *Corallorrhiza*. Although Robert Brown was there and in the later compendium of Ames, his Enum. Orch. U. S. and Can. 21 (1924), made the first post-Linnean author of the genus, Brown himself had cited the genus as starting after 1753 in Haller's Hist. Stirp. Helvet. ii. 159 (1768). That was correct, so far as it went, and Haller in 1768 had adopted the better Greek spelling, *Corallorrhiza*. Brown gave the common circumboreal species the specific name *C. innata* R. Br. in Ait. Hort. Kew. ed. 2, v. 209 (1813).

In Gray's Manual, ed. 7, and in his Enumeration of 1924 Ames took up for the original species of the genus, the latter said by him to date from 1813, a binomial dating from 53 years prior to Brown's publication, a case of putting prophecy before history which has puzzled many students, for the genus *Corallorhiza* and its species *C. trifida* were both clearly and very adequately published in Chatelain's Specimen inaugurale de Corallorhiza in 1760, the genus clearly diagnosed on p. 6, the species on p. 8. Here, so far as I can find, is the initial date (after 1753) for both CORALLORHIZA and its original species, *C. trifida*, which was based on *Ophrys Corallorhiza* L. (1753). We thus get rid of the situation wherein a binomial seems to have been published 53 years earlier than the genus under which it was placed; but, at the same time, we can return to the long-familiar spelling of the generic name, since, by the International Rules of Nomenclature, the original spelling (in this case of Haller in 1742 as well as of Chatelain in 1760) must stand[1]. The correction of the first post-

[1] Since the above was written the similar decision of Rendle and Britten in Journ. Bot. xlv. 442 (1907) has come to my attention: "This genus was established by J. J. Chatelain 'Specimen inaugurale de Corallorhiza' 1760. He names the species C. TRIFIDA, which must stand, as the Linnean trivial *Corallorhiza* (under *Ophrys*) is inadmissable".

Linnean author of the genus (but incorrectly as *Corallorrhiza*) was made in Britton & Brown, Ill. Fl. ed. 2, i. 574 (1913) but, singularly enough, in a work seeming to be authoritative, Schlechter's Monographie der Gattungen und Arten in Keller & Schlechter, Monographie und Iconographie der Orchideen Europas und des Mittelmeergebietes, Fedde, Rep. Spec. Nov. Sonderbeiheft A, Lief. 9–10, 302, 303 (1928), the anomaly again appears: the genus *Corallorhiza* here started from Robert Brown in 1813, but its single European species given as "1. C. **trifida** Chatel., Spec. inaug. Corall. (1760), p. 8"!

In current works on the flora of the northeastern United States the lip of *Corallorhiza trifida* is described as "white, not spotted" (Gray's Man. ed. 7), "lip unspotted" (Wiegand & Eames, Fl. Cayuga Lake Basin), "lip usually pure white" (A. M. Fuller, Studies on the Fl. Wisc. Part I: The Orchids), etc.; though rarely in America it is described, as by Morris & Eames (Our Wild Orchids), as "almost as often spotted as unspotted". Their discussion, however, shows that no distinction was being made between plants of North America and those of northern Eurasia and that they included Canada to the Arctic. In view of the usual lack of red or purple mottling of the lip in the United States and southernmost Canada it is worth noting that Chatelain, in his original account of European *C. trifida*, said "labellum . . . album, punctis coccineis notatum", while Schlechter, l. c., describing the European plant, says "die Petalen zuweilen rotpunktiert, Lippe weiss rotpunktiert".

In 1916, Cockerell in Torreya, xvi. 231, getting in Colorado the common plant of the United States, with "lip whitish", described it as *Corallorhiza Corallorhiza coloradensis* n. subsp., he then separating it because the true European plant, as shown by the enlarged figures of flowers published by H. Müller, has the throat "dotted with dark pigment". Almost a century earlier, however, Thomas Nuttall clearly understood the situation when he monographed our species in his *Remarks on the Species of Corallorhiza, indigenous in the United States* in Journ. Acad. Nat. Sci. Phila. iii. 135–139, with plate (1823). Nuttall there defined his new *C.* "*verna* . . . petalis omnibus lineari-lanceolatis patentibus, labello oblongo immaculato basi bidentato apice recurvo ovato calcare obsoleto innata . . . whole plant except the lip, of a

yellowish-green colour . . . Lip nearly white, without spots", etc. This species, *C. innata* in the sense of Muhlenberg, Amos Eaton and Nuttall's Genera, was based primarily on material from New England and in his "OBSERVATION" Nuttall wrote: "Mr. Eaton justly remarks the discrepancy of this plant with the species which I had erroneously considered the *Corallorhiza innata* of Europe"; but, pursued by the fatality which so often confuses those who attempt clarification, Nuttall proceeded in his discussion to ascribe to his new eastern American *C. verna* (which he had just correctly defined as "whole plant except the lip, of a yellowish-green colour . . . three outer petals lanceolate-linear spreading; the two inner . . . [of] nearly the same figure and colour. Lip nearly white, without spots, . . . the point ovate") the distinctive characters of European *C. innata!* These were given (with obvious lapse or omission of a phrase) in his observation where he said of his new species: "It differs also from the European . . . principally in the oblong ovate form and whiteness of the inner lateral petals [characters of the *European*], also by the lip which is obtuse and spotted [the spots belonging to the *European*], and in the connivence of the two upper and outer petals with the inner [as shown in detailed figures of the *European*]".

Only by those who see no difference between the Eurasian and the more boreal North American plant, with connivent sepals forming a hood, blunt oblong white petals and round-tipped spotted lip, and the temperate American plant with lanceolate sepals, linear-lanceolate yellow-green petals, lip abruptly tipped and unspotted, Nuttall's confusion of the two in his "OBSERVATION" will be applauded. By those who have carefully compared the two series it will be recognized that in the main the temperate North American plant with "Lip white, unspotted", is well separated from the Eurasian and Hudsonian North American *C. trifida*.

In 1926, reporting on explorations in northern Newfoundland of a party of New England and more southern botanists who were all familiar with the narrow-petalled plant with unspotted lip, I recorded from near the Straits of Belle Isle (a Hudsonian to Subarctic area) a plant which differed from what we had been considering to be true *Corallorhiza trifida*. "The plant which was

troubling us had more purple; . . . the sepals purple or brown; the lip larger and with long rows of purple dots below the marginal notches", etc.—Fernald in Rhodora, xxviii. 93 (1926). This plant was then identified with the original description and beautiful colored plate of the northern European *C. ericetorum* Drejer, a plant which is now generally considered an unimportant (small) phase of true *C. trifida*. Now, with the generous aid of Dr. Schubert in making dissections, it appears that the more northern plants in North America are true *C. trifida*, occurring from southern Greenland to Alaska (thence to northern Eurasia), south in tundra, peat, moss and peaty thickets or woods to northern Newfoundland, the Côte Nord of Quebec, shores of Hudson Bay, northern Ontario, and along the mountains to Wyoming and Oregon.

Meeting the southern limit of true *Corallorhiza trifida* in North America and sometimes overlapping it is the northernmost series of *C. verna* Nutt. Perfectly definite southward, the latter seems northward to show transitions, whether through crossing or otherwise, and its treatment as a relatively southern variety of the more boreal and typical *C. trifida* seems justified. It thus becomes

Corallorhiza trifida Chatelain, var. **verna** (Nutt.), comb. nov. *C. verna* Nutt. in Journ. Acad. Nat. Sci. Phila. iii. 134 (1823). *C. odontorhiza* (Willd.) Nutt., β. *verna* (Nutt.) Wood, Class-Bk. ed. 2: 531 (1847). *C. innata* R. Br., var. *virescens* Farr in Contrib. Bot. Lab. Univ. Pa. ii. 425 (1904). *C. Corallorhiza*, ssp. *coloradensis* Cockerell in Torreya, xvi. 231 (1916). *C. trifida*, var. *virescens* (Farr) Farwell in Papers Mich. Acad. Sci. xvi. pt. 1: 9 (1941).—Details of flower well shown by A. M. Fuller, Bull. Pub. Mus. Milwaukee, xiv. no. 1, pl. 51 (as *C. trifida*) (1933).—Dry to moist woods, sometimes in bogs, Newfoundland to British Columbia, south to Nova Scotia, New England, New Jersey, Pennsylvania, mountains to Georgia and Tennessee, Ohio, northern Indiana, Wisconsin, Missouri, South Dakota, Colorado and Oregon.

Details of flowers of typical *Corallorhiza trifida* are shown in many European works. A few specially accurate illustrations are the following: Reichenb. f., Ic. Fl. Germ. xiii–xiv. pl. 490 (1851); H. Müller, Alpenbl. 77, fig. 21 (1881); Knuth, Handb. Blütenbiol. ii. pt. 2: 456 (1899); Correvon, Album Orchid. pl. 9 (1899); Lindman, Svensk. Fanerogamfl. fig. 125, no. 6 (1918).

The largest-flowered species of *Corallorhiza* in temperate North America, *C. striata* Lindl., has a remarkably disrupted range: the Gaspé Peninsula; southwestern Quebec to western Ontario, south to northwestern New York and southern Ontario, Michigan, northern Wisconsin and northeastern Minnesota; southern Alberta and southern British Columbia, with tongues down the mountains to northwestern Wyoming, eastern Idaho and California; in the East preferring calcareous woodlands and growing chiefly at the bases of *Thuja occidentalis*. Throughout this broad range the plant (scape, sheaths and perianths) is of a warm madder-purple, with the sepals and 2 upper petals conspicuously 3 (or 2)-striate with deep purple. At the easternmost limit of the range the stem, sheaths and perianth are yellow- or orange-brown, comparable with color-forms in *C. maculata* Raf.[1] and *C. odontorhiza* (Willd.) Nutt. This plant may be called

C. STRIATA Lindl., forma **fulva,** forma nov., scapo vaginis perianthiisque fulvis. TYPE: arbor-vitae woods, cold walls of Percé Mt., Percé, Gaspé Co., Quebec, July 25, 1905, *Williams, Collins & Fernald* (Herb. Gray.).

(To be continued)

APPLICATION OF THE NAME EUPHORBIA MACULATA L.

F. R. FOSBERG

SVENSON, in his valuable discussion of the Descriptive Method of Linnaeus (RHODORA **47:** 273–302, 363–388, 1945), disagrees with Wheeler's interpretation of the Linnaean *Euphorbia maculata*. The latter (Contr. Gray Herb. n. s. **127:** 76, 1939) applied this name, on the basis of the Linnaean specimen, to the upright species long known as *E. nutans* (or *E. Preslii*), regarding the Plukenet figure cited by Linnaeus as of secondary importance. Svenson, arguing that the latter figure is of equal significance

[1] When, in RHODORA, xxiv. 145–148 (1922), Bartlett defined (as varieties) the color-forms of *Corallorhiza maculata* Raf. in Am. Mo. Mag. ii. 119 (1817), he considered the yellow plants as relatively rare, while his purplish var. *punicea* is relatively common. He then concluded: "The deeply purple-stemmed var. *punicea* might with some reason be viewed as the biological type of the species, and therefore chosen, in the absence of a type specimen, as the nomenclatorial type as well". Bartlett and those who have followed him, but treating the color-forms as formae, apparently overlooked Rafinesque's statement that in the original *C. maculata* "the whole plant is yellowish".

EUPHORBIA MACULATA: FIG. 1, Plukenet's figure (in part), Alm. t. 65, f. 8; FIG. 2, *E. supina* Raf. from Winchester, Massachusetts, *Smith & Zimmerman;* FIG. 3, Washington, D. C., *Freeman.*

FIG. 4, EUPHORBIA MACULATA: the specimen in Herb. Linnaeus.

with the specimen in illustrating Linnaeus' concept, used the case of *E. maculata* as an example, attempting to show that if the Plukenet figure is regarded as the type, long-established usage will be preserved and the name will continue to be applied to the prostrate plant referred by Wheeler to *Euphorbia supina* Raf.

To test Svenson's conclusions I examined the specimens of the two species in the herbarium of the U. S. National Arboretum, many of them annotated by Wheeler, and compared them with Svenson's reproduction of Plukenet's figure (RHODORA **47:** pl. 990, 1945). The results were as follows:

(1.) The upright plant (our FIG. 3) frequently has the reduced axillary shoots, referred to by Svenson, as well developed

as in Plukenet's figure (our FIG. 1). (2.) The leaves of the upright plant practically always have petioles as long as or longer than those of *E. supina* (our FIG. 2). (3.) Most important of all, the length of the leaves in the Plukenet figure is over half that of the internodes, corresponding to the upright plant (FIG. 3) rather than the prostrate one (FIG. 2), which has them less than half. This gives a valuable clue to the scale of the drawing.

The Plukenet figure looks as though it represented an upright plant rather than a prostrate one, though this is inconclusive. Furthermore, in Linnaeus' treatment nothing is said about a prostrate habit, though this character is striking enough so that it probably would have been mentioned.

Moreover, the statement in the Mantissa (**2:** 392, 1771) "*Euphorbia maculata* similis *E. hypericifoliae*" lends weight to Wheeler's conclusion, as *E. hypericifoliae* L. is superficially almost indistinguishable from *E. maculata* (sensu Wheeler), while it bears no resemblance to the prostrate *E. supina*. Most important of all, the specimen preserved by Linnaeus and in his Herbarium when he prepared *Species Plantarum* (1753) is, as shown by a photograph (our FIG. 4) provided by Professor Fernald, the upright plant which Plukenet had shown, not the prostrate one selected by Svenson.

The addition of the photo. of the modern upright specimen to Svenson's plate removes all force from the similarity of his two illustrations.

My conclusion, therefore, is that both the Plukenet plate and the entire Linnaean treatment apply to the upright plant, which should be called *Euphorbia maculata* L. The confusion surrounding this species did not exist in Linnaeus' concept, but was introduced by later misinterpretations. This example, consequently, does not seem to have much bearing on the problem of the application of Linnaean names to present-day concepts.

Falls Church, Virginia.

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Rhodora

JOURNAL OF

THE NEW ENGLAND BOTANICAL CLUB

Vol. 48. **September, 1946.** **No. 573.**

THE AMOS EATON HERBARIUM

E. D. Merrill

In 1937 Mr. Gustafson[1] published an account of what he took to represent an Amos Eaton herbarium. It is reported that this small collection, now preserved at the Rensselaer Polytechnic Institute, Troy, New York, contains 111 specimens labeled in Eaton's handwriting. That this book of specimens now at Troy, where Eaton taught, was thought to have been picked up in a southern farmhouse by a Union soldier in the Civil War strengthens the idea as to the possibility or even the probability that this collection, which I have not seen, actually represents a student's herbarium corresponding to that of Mr. David L. Coe. Dr. Barnhart[2] has discussed the Coe herbarium which was taken by Mr. Coe to Ohio soon after 1818, and over a century later was discarded by one of his descendants in Ashland, Oregon. Mr. Coe was one of Eaton's students at Williams College, in the class that actually financed the publication of the first edition of the latter's Manual in 1817.

In searching for the numerous unlisted technical names for plants, some deliberately, some inadvertently originated by Eaton in the eight editions of his Manual between 1817 and 1840, certain problems as to the identity of individual species arose. While most of the approximately forty new species actually published by Eaton can be placed from his descriptions, which are mostly short or very short, in some cases it seemed to be desirable

[1] **Gustafton, A. H.** A Note on Amos Eaton's Herbarium. Rhodora **39:** 153–155. 1937.

[2] **Barnhart, J. H.** A Century-Old American Herbarium. Jour. N. Y. Bot. Gard **35:** 241–245. 1934.

to examine specimens that Eaton might have had before him, could they be located. Accordingly a serious attempt was made to locate Amos Eaton's herbarium in the hope that it might contain his actual types. Nothing further developed at Williamstown, Troy, or Albany, and then, because of Eaton's connections with Yale University, it occurred to me that something might be available there. This proved to be the case. The Amos Eaton herbarium, now the property of one of his great-grandsons, Mr. George Eaton, is deposited in the Osborn Botanical Laboratory, Yale University, and through the courtesy of Dr. E. W. Sinnott it was made available to me for examination.

The first Eaton herbarium consists of four books nine by eleven inches and about two inches thick, each with about ninety sheets. On the back of each is the lettering "A. Eaton's Herbarium" and on the fly leaf of one volume is the signature of Sara C. Eaton, followed by the statement "from Rens. Institute, Troy, N. Y." This herbarium originally contained 1237 small specimens, many of them mere scraps, but a few of the specimens have been destroyed or lost. In the herbarium are representatives of five species that Eaton described as new, either on his own account or for other botanists, these being *Xylosteum solonis* Eaton, *Sarracenia heterophylla* Eaton, *Polygonum natans* Eaton (*P. fluitans* Eaton), *Lonicera hirsuta* Eaton and *Hydnum chrysorhizum* Torr. ex Eaton. These are the only "types" that were located representing the forty species that he described as new either on his own account or for other botanists. Therefore the fact that the Eaton herbarium is finally located is merely of slight historical importance, largely because he apparently did not consider it necessary or even desirable to retain specimens representing genera or species that were described as new in the various editions of his Manual. Curiously there appear in the herbarium two specimens from Rafinesque which from the accompanying holographic descriptions of Rafinesque were collected at Fishkill, New York, both of which were considered by Rafinesque to be new, but which Eaton did not accept. Neither of the species was "new" at the time, but examination of these specimens enabled me to place two Rafinesque binomials that had appeared as *nomina nuda* in various papers published by that erratic botanist.

In Eaton's Manual, ed. 2, p. 5, 1818, he states that he then had representatives of about 1600 species in his herbarium. It seems to be clear that the specimens were at that time unmounted, and that the selected material was not mounted until after the third edition of the Manual appeared in 1822. While a few of the species that are described in the first or second edition of the Manual appear in the collection, such as *Xylosteum solonis* Eaton, *Lonicera hirsuta* Eaton, and *Hydnum chrysorhizum* Torr. ex Eaton, it is also to be noted that others that were not described until edition three appeared in 1822 also occur, namely, *Sarracenia heterophylla* Eaton and *Polygonum natans* Eaton.

The material that Eaton elected to preserve consists for the most part of mere snips, mostly several to many species mounted on a sheet, the arrangement being in accordance with the Linnaean classes. Apparently when the selected specimens were arranged for mounting, the names, in greatly abbreviated form, were penciled on the sheets, for in some cases the specimens in part cover these entries; later Eaton wrote the name in ink near each specimen. There are in general no notes, few localities are indicated, and no dates of collection other than an occasional indication of the month. The few localities that are given appear chiefly as N. H. = New Haven, A = Albany, W = Williamstown, etc. In most cases the species appear to be correctly named in accordance with the nomenclature of the time. There are usually three or four, sometimes six or more species mounted on the same small sheet, or in the case of the cellular cryptogams as many as twenty or more species on a single sheet. On the whole, apparently, this Eaton herbarium is exactly the type that he required his students to prepare, if we may judge from the extant herbarium of David L. Coe, mentioned above; except that in the Coe collection the specimens are very much better than are those in Eaton's own herbarium.

There is a second Amos Eaton herbarium at Yale University of which only one of the two books still exists. This covers classes I to X of the Linnaean system. The specimens are somewhat better than are those in the first and larger herbarium. There are 225 species in book one of this herbarium, many of them representing the same species as those in the first collection. In a few cases dates of collection are given, the latest being 1834.

All the specimens are labeled, the label taking the form of a slip of paper pasted across the lower end of the specimen, bearing the name, sometimes a few other data, and always figures referring to the generic names used in the last (1840) edition of the Manual. The handwriting on the labels is not that of Amos Eaton but may represent that of John Wright, the co-author of this edition. In the front of the book, however, is a written list of the contents of the two volumes, and this is in Eaton's handwriting. From this index it is evident that there were in book two (which apparently no longer exists) about 278 additional specimens in classes XI to XX. No Eaton types were located in this second herbarium.

It was at first thought that the Amos Eaton herbarium discussed by Gustafson, mentioned above, might represent the missing part of this second Eaton herbarium now at Yale University. This, however, cannot possibly be the case, judging from the data given by Mr. Gustafson. He inferred that perhaps Eaton has assembled large collections of botanical material in his travels, but I find no evidence in support of this idea. That Eaton did receive rather extensive collections from his numerous correspondents is evident, and he certainly had the opportunity, as did John Torrey and the somewhat later Asa Gray, of building up an important historical collection of botanical specimens, an opportunity that he did not grasp. Whether the material that he did receive was discarded by Eaton himself as valueless and not worthy of preservation, or whether it was discarded by someone else after Eaton's death, there seems to be no way of determining a century after the event.

It had been hoped that there might be located in the Eaton herbarium not only specimens of the twenty new species that Eaton himself named and described, but that also there might be present specimens representing approximately the same number of species named and described by Torrey, Hall, Aikin, Beck, Tracy, and Le Conte, but actually published by Eaton for these authors. Only one of the latter was located, and of the former the holotypes of only four of the twenty species involved.

Eaton never claimed to be a professional botanist. He was interested in botanical instruction and in popularizing the study of botany. His attitude was apparently always that of the

amateur rather than that of the professional botanist. Becuase of the very simplicity of his text, and because of the obscurity of publication of approximately 200 new names proposed by him, a remarkably high percentage of these new names have remained for a century or longer unlisted in our standard indices, and hence, for the most part entirely overlooked by modern botanists. Only about fifty of the two hundred new Eaton names have previously been listed, and in these entries there are approximately thirty-five corrections to be made, as Eaton actually published the names earlier than the current entries indicate. A special paper on these overlooked names will appear in a future issue of Bartonia.

Arnold Arboretum

Notes on New Hampshire Plants.—In their recent report, completing their consideration of the distribution of the *Gramineae* of New England, Bean et al.[1] specifically state that *Phragmites communis* Trin. var. *Berlandieri* (Fournier) Fern. has not been reported from New Hampshire. In the past two years I have twice collected this grass in Strafford County. However, not sufficient time has elapsed for these collections to have become available in herbaria. One of the new stations is an inland swamp in the township of Lee. There it grows amongst Alders and scattered specimens of *Rhus Vernix* L. and near a colony of *Rhamnus alnifolia* L'Hér. The second locality is in Durham, at the edge of a salt-marsh near the upper tidal limits of the Oyster River. The plants were observed there in August, 1945.

Lemna valdiviana Philippi, according to herbarium records, has been found previously in New Hampshire only in Rindge in Cheshire County. Apparently it has not been reported from Maine. A number of years ago, in rapidly flowing water of the Bellamy River in the township of Madbury, I collected an intertwining mass of vegetable matter which was finally traced to this species. The somewhat falcate fronds, each with one evident vein, characterize the species.

Gerardia virginica (L.) BSP., the Downy False Foxglove, gets into New Hampshire in the Connecticut Valley in Hinsdale and

[1] Preliminary Lists of New England Plants, XXIV. Rhodora XLVIII, 17–27 (1946

Alstead and far to the east in Durham[1]. I have collected the species in three widely separated areas in Durham-township. Two of the stations are in oak woods immediately adjacent to brackish water, the third is near Packers' Falls in an oak woods on a dry slope.

In the autumn of 1945, I took a small group of students to the Packers' Falls area, particularly to point out an interesting type of oak-hickory forest. The trip was rewarded by our finding some vigorous specimens of *Lechea villosa* Ell. This represents an extension of range northward and eastward in the state from Pelham and Milford. A further canvas of that part of Maine bordering on the Piscataqua River might yield this handsome member of the genus, although up to this time no reports from that state have been forthcoming.

Similarly absent from Maine and not known heretofore from eastern New Hampshire, according to records, is that very unique hickory, *Carya cordiformis* (Wang.) K. Koch. In late August of 1945 I found it as scattered specimens on warm slopes in perfectly natural situations adjacent to Great Bay in Durham, near the Newmarket line. There it was associated with *Carya ovata* (Mill.) K. Koch and at least one other member of the group, presumably *Carya ovalis* (Wang.) Sargent. It is interesting that, according to Hyland and Steinmetz in their recent careful and authoritative "Woody Plants of Maine", only one Hickory is certainly reported there as native—*Carya ovata* (Mill.) K. Koch. Again, perhaps in much botanized York County, Maine, in proper situations other additions to the Maine flora await discovery.

Specimens of the above species from the stations mentioned are distributed among the following herbaria: the Gray Herbarium, the Herbarium of the New England Botanical Club, and that of the University of New Hampshire.—ALBION R. HODGDON, University of New Hampshire, Durham.

[1] F. W. Pennell, "The Scrophulariaceae of Eastern Temperate North America", Academy of Natural Sciences of Philadelphia, Monograph No. 1, 1935, Map 94 (above), shows this species as present in New Hampshire only in the Connecticut Valley and entirely absent from Maine. In his discussion, loc. cit. p. 385, Pennell comments on its host-relationship as follows: "It has been shown to be parasitic on the roots of *Quercus prinus* L. and doubtless of other species of white oaks". Certainly in Durham where *Quercus Prinus* L. is not associated with the *Gerardia* and, in fact, has never been collected, the Downy False Foxglove is parasitic on the prevalent *Quercus alba* L.

CONTRIBUTIONS FROM THE GRAY HERBARIUM OF HARVARD UNIVERSITY—NO. CLXII.

IDENTIFICATIONS AND REIDENTIFICATIONS OF NORTH AMERICAN PLANTS

M. L. Fernald

(*Continued from page 197*)

Corydalis **Halei** (Small), Fernald & Schubert, comb. nov. *Capnoides Halei* Small in Bull. Torr. Bot. Cl. xxv. 137 (1898). *Corydalis aurea*, var. *australis* Chapm. Fl. So. U. S. ed. 2: 604 (1883). *Corydalis micrantha*, var. *diffusa* Fedde, Repert. Nov. Spec. x. 380 (1912).

Corydalis Halei seems to be a very distinct species of the southeastern Atlantic Coastal Plain and the Gulf Coastal Plain, extending inland, in sandy soil, to southeastern Missouri. Chapman well described it as *C. aurea* Willd., var. *australis* but the crested keel of the outer petals, as well as its tendency to produce cleistogamous inflorescences, place the species nearer *C. micrantha* (Engelm.) Gray. In fact, Dr. Gray united it with *C. micrantha* in the Synoptical Flora, i[1]. 98 (1895). *C. micrantha*, however, is an inland plant, found from Illinois to Nebraska, south to Tennessee, Arkansas, Oklahoma and Texas, with abundant and well developed foliage on the loosely ascending branches, the leafy summits mostly overtopping the longer terminal racemes. The latter are rather closely 3–12-flowered, and when fully expanded (in fruit) only 1.5–6 cm. long, with the lower and longer internodes 2–10 (–12) mm. long; its erect or strongly ascending fruiting pedicels are 0.5–3 mm. long, the thick-cylindric capsule scarcely torulose and 6–15 mm. long. *C. Halei*, on the other hand, is stiffly ascending, with leaves rapidly reduced upward, so that its terminal racemes overtop the foliage. The racemes quickly elongate to 0.5–2 dm., the 4–20 flowers and capsules all becoming remote, with the lower internodes of the rachis 1.5–2.5 cm. long. Its capsules, on pedicels 2–5 mm. long, are slender, torulose and 1.5–2.5 cm. long, often outwardly arching. An isotype of *C. micrantha*, var. *pachysiliquosa* Fedde, l. c., is a close match for an isotype of typical *C. micrantha*.

Arabis perstellata E. L. Braun, var. **Shortii,** nom. nov. *Sisymbrium dentatum* Torr. in Short, 3rd Suppl. Cat. Pl. Kentucky, 338 (1833), not Allioni (1785). *A. dentata* (Torr.) Torr. & Gray, Fl. N. Am. i. 80 (1838), not de Clairville (1811)[1]. *Shortia dentata* Raf. Aut. Bot. 17 (1840), at least as to "Sisymbr. do Tor. et Arabis!" *Iodanthus dentatus* (Torr.) Greene, Pittonia, iii. 254 (1897).

A. perstellata, var. **phalacrocarpa** (M. Hopkins), comb. nov. *A. dentata,* var. *phalacrocarpa* M. Hopkins in Rhodora, xxxix. 169 (1937).

Several acute botanists have called my attention to the fact that the name *Arabis dentata* (Torr.) Torr. & Gray (1838) is a later homonym, invalidated by de Clairville's *A. dentata* of 1811. I, naturally, passed the matter on to Dr. Milton Hopkins, before he became discouraged with the financial outlook for the university botanist and took to another and, we hope, more remunerative profession. Dr. Hopkins agreed with me that the very distinct and localized *A. perstellata* E. L. Braun in Rhodora, xlii. 47 (1940), while differing from typical and wide-ranging *A. dentata,* must be considered an extreme variety of the same series, many of the characters showing transitions in a large series of specimens. While it is anomalous that the plant of broad range should be treated as a geographic variety of a very local one, there seems to be no other specific name available. The usual source of many names which might be picked up, Rafinesque, seems to have been satisfied to retain the trivial name for his *Shortia dentata.* It would now be helpful if he had employed another.

Asclepias viridiflora Raf., var. **linearis** (Gray), comb. nov. *Acerates viridiflora* (Raf.) Eaton, var. *linearis* Gray, Syn. Fl. ii[1]. 99 (1878).

[1] **Joseph Philippe de Clairville (1742–1830) was one of the most modest and self-effacing taxonomists I have ever encountered. His *Manuel d'Herborisation en Suisse et en Valais* (1811) was "Par l'Auteur de l'Entomologie helvétique", without indication of his name; while the 26-page Preface was unsigned—merely "21. Fevrier 1811". How unlike the modern counterparts of the visionary Bombastus Paracelsus who imagine that they are helping by publishing such combinations as *Phyton euphyton* Bombastus Superbus, ssp. *euphyton* (Bombastus Superbus) Bombastus Superbus, comb. nov., var. *euphyton* (Bombastus Superbus) Bombastus Superbus, comb. nov.,—based on *Phyton euphyton* Bombastus Superbus in Journ. Erudit. clv. 00.000 (194?). So far as I can find no genus was ever dedicated to *Bombastus Paracelsus.* Clairvillea was defined by DeCandolle with the dignified dedication: "Dixi in memoriam cl. de Clairville Galli botanici et entomologici de historiâ naturali Helveticâ benè meriti", DC. Prodr. v. 636 (1836).**

Since the characters supposed to separate *Acerates* from *Asclepias* so definitely break down the preceding combination is needed. Whereas typical *Asclepias viridiflora* and its var. *lanceolata* (Ives) Torr. extend eastward to the Atlantic States, var. *linearis* is an inland extreme, from western Ontario and Manitoba south to Louisiana, Oklahoma and New Mexico.

Triodanis versus Specularia (Plates 1049 and 1050).—Under the title *The Genus Triodanis Rafinesque, and its Relationships to Specularia and Campanula* Dr. Rogers McVaugh[1] has discussed in detail what he considers the strongest characters separating *Specularia* Heist. and *Triodanis* Raf. from *Heterocodon* Nutt. and *Campanula* L. Since the three species already recognized in the "Manual range" as belonging in *Specularia* (and some new ones which occur in Missouri) are all treated as belonging to *Triodanis*, I have found it necessary to study with some care the characters relied upon as separating the American and Eurasian *Triodanis* from the chiefly Eurasian and North African *Specularia*. McVaugh's statement of the strongest characters (as contrasted with those of the other two genera, which need not here be considered) are as follows:

> *Specularia* Heist. ex Fabr. Plants annual, branching above the middle; the flowers nearly sessile, clustered near the tips of the branches or corymbosely aggregated at the summit of the plant; flowers all open, or some imperfectly developed but open and not vestigial; corollas divided well below the middle, more or less rotate [this in contrast with *Heterocodon*]; filaments gradually widened to base, glabrous; capsules much elongate, linear, contracted at apex beneath the calyx-lobes, dehiscent at apex. Two species, western and southern Europe.
>
> *Triodanis* Raf. Plants annual, the branches, if any, from base or middle of the plant; flowers axillary, sessile or essentially so, the inflorescence spiciform; flowers from the lower nodes normally cleistogamous, with the corolla and androecium vestigial; some of the upper flowers or at least the terminal one usually open (all corollas sometimes open in *T. coloradoensis*), with expanded corollas divided below the middle [this, likewise, in contrast with the American *Heterocodon*]; filaments abruptly dilated and ciliate at base; capsule ovoid or clavate to linear or subulate, usually not abruptly contracted at apex, opening at the apex or (in *T. perfoliata*) at the middle or a little above it. Eight species, one chiefly Mediterranean, the others American.

If these are, indeed, distinct genera, separated on constant morphological characters, in the sense of genera of Eichler,

[1] McVaugh in Wrightia, i. 13-53 (1945)

DeCandolle, Bentham & Hooker and Engler & Prantl, we should hardly expect so many qualifying expressions or exceptions in the statement of differential generic characters, especially when, in the detailed accounts of species so many additional exceptions to the generic definition are stated. Taking up the reputed GENERIC differences in order, we, without monographic knowledge of details, note the following items.

1. "Plants annual, branching above the middle" in *Specularia*, as opposed to "branches, if any, from base or middle of the plant" in the reputed genus *Triodanis*. If Rafinesque had made such a distinction we should not be surprised; but, noting in passing, that small plants of European, southwestern Asiatic and North African[1] (not merely of "western and southern Europe") *Specularia Speculum-Veneris* (L.) Tanfani[2] (*S. speculum* A. DC.), the type of the genus *Specularia*, may be quite simple, we come to the very evident fact that of 59 individuals in the Gray Herbarium, these mostly validated by McVaugh, 29 *branch from the very base* (PLATE 1049, FIG. 1) or just above it. Similarly, the second species allowed by McVaugh to stay in *Specularia*, which he distinguished generically by "branching above the middle", the southern European (also North African—"a Barbariâ (Desf.)", A. DC. l. c. 349) *S. hybrida* (L.) A. DC., shows in the Gray Herbarium 40 individuals with strictly or primarily basal branching (PLATE 1049, FIG. 3) and 25 quite simple, but only 3 branching definitely near (not "above") the middle. When, furthermore, we note that in the first species taken up by Mc Vaugh (l. c. 25) as generically distinct from Old World *Specularia* (because, as to branching at least, *Specularia* has the "branching above the middle", whereas *Triodanis* has "the branches, if any, from base or middle" (not "above the middle")—when we note McVaugh's detailed description of his *Triodanis coloradoensis* (Buckl.) McVaugh (our PLATE 1050, FIG. 1) as "with branches . . . from the nodes just above the middle of the plant (usually

[1] "Syriâ . . . et Barbariâ"—A. DC. Mon. Camp. 347 (1830); "Palestinae (Boiss!) Aegypti . . . (Bal!) . . . Berythum Syriae . . . Africa borealis"—Boissier, Fl. Orient. iii. 959 (1875).

[2] Although the combination *Specularia Speculum-Veneris* appears in Index Kewensis. Suppl. 1 (1902) as made by Caruel in Parlatore, Fl. Ital. viii. 139 (1888), a check on the cover-page of vol. viii reveals the pertinent statement: "CAMPANULACEE. JASMINACEE. OLEACEE. PER ENRICO TANFANI," this author also cited at the beginning of the *Campaniflore*, p. 15.

not with basal branches)", it almost seems as if we were reading the contradictory writings of the author of *Triodanis*. The branching, as most taxonomists would suspect in annual weedy plants, is not a constant or even nearly constant GENERIC character.

2. Flowers "nearly sessile, clustered near the tips of the branches or corymbosely aggregated" in *Specularia;* "axillary, sessile or essentially so, the inflorescence spiciform" in *Triodanis.* The first point, whether the flowers are sessile or nearly so is not a generic difference and was put in, apparently, to contrast with the peduncles of *Heterocodon;* but when one views the inflorescence of the basic *Specularia Speculum-Veneris* (our PLATE 1049, FIG. 2) and one of a species of the supposedly different genus *Triodanis, T. coloradoensis* (PLATE 1050, FIG. 2), both figures from specimens validated by McVaugh, and when he notes that Boissier, one of the truly great taxonomists, who clearly understood the Old World species, described *S. Speculum* δ. *racemosa* with "Inflorescentia . . . ut in *Sp. falcatâ* racemosa" (Boiss. l. c. 959), he stops to take a long breath. If *Specularia falcata* (Ten.) A. DC. is not a *Specularia* because its flowers are not "corymbosely arranged" as they are said to be in real *Specularia,* what about *S. Speculum,* var. *racemosa* which has the flowers racemose? And what about *Triodanis coloradoensis,* in which the flowers may be "corymbosely aggregated"? As a strong GENERIC difference this does not seem quite clear.

3. In *Specularia* "flowers all open, or some imperfectly developed but open and not vestigial"; in *Triodanis* "flowers from the lower nodes normally cleistogamous, with the corolla and androecium vestigial". This distinctive character of *Triodanis,* however, is at once weakened farther on in the same paragraph by the statement that "all corollas [are] sometimes open in *T. coloradoensis,*" this fact again stated in the full description of the quite unconventional Texan *T. coloradoensis:* "flowers . . . all . . . prevailingly fertile and open". Cleistogamy is a common trait of some species or sections of genera or in some strains within species. In *Utricularia* it sometimes occurs in some plants and with every transition from truly cleistogamous flowers through intermediates to those with large and showy expanding corollas. In one large and perplexing American subgenus of

Panicum the later and reduced panicles of apparently cleistogamous spikelets are diagnostic, yet no sound student of the grasses has suggested setting up *Panicum*, subg. *Dicanthelium* as a true genus. In *Viola* certain sections exhibit abundant cleistogamy, certain others not; yet, even to Rafinesque, Greene, Rydberg and Small they were all *Viola*. Late in the season *Danthonia* produces within and at the bases of the old sheaths specifically distinctive cleistogamous flowers, but if one species somewhere should not do so, we should hardly treat it, on that character alone, as another genus. Innumerable showy-flowered herbs, annual, biennial or perennial, will, under certain conditions, produce insignificant cleistogamous flowers. Yet, so far as I have seen, most of these cleistogamous individuals (except in case of *Utricularia*) have not been sorted out as separate genera. If *Triodanis coloradoensis* would obligingly stop its misbehavior, the case for a genus separate from *Specularia* would be less weak; and the case would gain a little strength if the Old World *S. hybrida* (left by McVaugh in *Specularia*) would stop producing "flowers . . . considerably reduced in size and apparently . . . a step in the direction of truly cleistogamous flowers" (McVaugh, p. 19). A little more and the step may prove fatal.

4. The characters, corolla divided "well below the middle" and "below the middle", were obviously put in as a contrast with the really different corolla of *Heterocodon*. This section needs no further discussion.

5. In *Specularia* "filaments gradually widened to base, glabrous"; in *Triodanis* "filaments abruptly dilated and ciliate at base". However, in three of the eight species of *Triodanis* McVaugh allows that the filaments may gradually widen to base: *T. biflora* (R. & S.) Greene conceded to have "Filaments . . . , the proximal half gradually or abruptly expanded; and *T. texana* McVaugh and *T. Holzingeri* McVaugh with filaments similarly described. That leaves (unchecked by me) filaments "glabrous" as opposed to "ciliate at base". In *Campanula* the filaments are either abruptly dilated or gradually dilated at the ciliate or glabrous base.

6. In *Specularia* "capsule much elongate, linear, contracted at apex beneath the calyx-lobes, dehiscent at apex"; in *Triodanis* "ovoid or clavate to linear or subulate, usually not contracted at

Photo. B. G. Schubert

SPECULARIA SPECULUM-VENERIS, both figs. × 1: FIG. 1, lower half of plant, showing basal branching, and FIG. 2, inflorescence, both from France.
S. HYBRIDA: FIG. 3, base, to show basal branching, from Italy.

Photo B. G. Schubert

SPECULARIA COLORADOENSIS (= *Triodanis coloradoensis*), both figs. × 1: FIG. 1, median third of plant, showing branching "above the middle" and fruits "corymbiform aggregated"; FIG. 2, flowering inflorescence.

apex, opening at the apex or (in *T. perfoliata*) at the middle or a little above it". The apical opening is at once dismissed as occurring in both *Specularia* and *Triodanis*, though another character was overlooked in the latter, for in his key to the species of *Triodanis* emphasis is placed on "Capsule opening from base toward apex" in *T. falcata* (Ten.) McVaugh. Furthermore, since Alphonse DeCandolle in his classic Monographie des Campanulées (1830) described (p. 348) the capsule of *Specularia Speculum-Veneris* as either "cylindrica, medio inflata, basi et apice angustata" or "non propriè cylindricâ, sed subfusiformi, utrinquè angustatâ", while Boissier (l. c. 959) defined *S. Speculum*, β. *libanensis* A. DC. with "capsulae abbreviatae interdum oblongae", the definition of the genus *Specularia* as having the capsule "linear" (a measurement of flat surfaces, not solids) is not convincing, especially since *Triodanis* is allowed "linear or subulate" capsules. Nor is the tip of the capsule a strong generic character: "contracted at apex" in *Specularia*, "usually not contracted at apex" in *Triodanis*. For, as already quoted from Alphonse DeCandolle, the type-species of *Specularia* may have "capsulâ . . . utrinquè angustatâ", although his *S. hybrida* (which McVaugh leaves in *Specularia*) has "Capsula prismatica, basi apiceque abruptè constricta". Similar contrasts occur in American species of so-called *Triodanis:* for instance McVaugh's description of *T. coloradoensis* (embarrassing species, always getting in the way!) contains "Capsule . . . oblong-linear or clavate [as also that of *T. falcata* (Ten.) McVaugh] usually abruptly narrowed distally"; and they are "truncate" in *T. Holzingeri* McVaugh.

From this recapitulation of the stated characters supposed to separate a genus, *Triodanis* Raf., from *Specularia* it must be apparent that the so-called generic characters set up in support of such a segregation fail at altogether too many points. I find myself following Endlicher, Alphonse DeCandolle, Boissier, Bentham & Hooker and Schönland (in Engler & Prantl) in keeping *Triodanis* in *Specularia*. I cannot follow Rafinesque, Greene and McVaugh in considering it a clearly distinct genus. As my friend Pease remarks, "Too much present-day writing is quantitative rather than qualitative."

Although as a genus *Triodanis* seems to me very weak, the

species defined under it seem to me very strong. It becomes necessary, therefore, to transfer three of them to *Specularia*. I dislike so to do, for it would have been much more satisfactory if the author who clearly worked them out had himself placed them in *Specularia*.

SPECULARIA **lamprosperma** (McVaugh), comb. nov. *Triodanis lamprosperma* McVaugh in Wrightia, i. 42 (1945).

S. **texana** (McVaugh), comb. nov. *Triodanis texana* McVaugh, l. c. 43 (1945).

S. **Holzingeri** (McVaugh), comb. nov. *Triodanis Holzingeri* McVaugh, l. c. 45 (1945).

EXPLANATION OF PLATES 1031–1050

PLATE 1031, QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, foliage and fruit, × 1, from Michaux's original plate; FIG. 3, fruit of *Q. rhombica* Sargent, from Sarg. Man. ed. 2, fig. 239; FIG. 4, leaf, × 1, from Michaux's original plate of Q. LAURIFOLIA, VAR. HYBRIDA, basonym of *Q. obtusa* (Willd.) Ashe.

PLATE 1032, QUERCUS LAURIFOLIA Michx.: FIGS. 1 and 2, fruiting branch and terminal leaves from Windman's Mill, south of Sunbeam, Southampton Co., Virginia, *Fernald & Long*, no. 11,323; FIG. 3, leaves of fruiting branch, originally and correctly identified as *Q. laurifolia*, later cited as a PARATYPE of *Q. rhombica* Sargent, and later identified as *Q. obtusa* (Willd.) Ashe, from Monroe, Ouachita Parish, Louisiana, *E. J. Palmer*, no. 8934.

PLATE 1033, QUERCUS LAURIFOLIA Michx.: FIG. 1, venation of lower leaf-surface, × 3, of Michaux's type, from photograph by *Cintract;* FIG. 2, foliage of type of *Q. rhombica* Sargent; FIG. 3, venation, × 3 (by transmitted light) of lower leaf-surface of type of *Q. rhombica*.

PLATE 1034, QUERCUS LAURIFOLIA Michx.?: portions of TYPE, × 1, of *Q. rhombica*, var. *obovatifolia* Sargent or *Q. obtusa* (Willd.) Ashe, var. *obovatifolia* (Sarg.) Ashe.

PLATE 1035, QUERCUS HEMISPHAERICA Bartram ex Willd., both figs. × 1: FIG. 1, *Q. aquatica*, var. from Michx. Hist. Chênes Am. Sept. t. 20, fig. 2, cited by Willdenow; FIG. 2, toothed leaves of young tree, from Gainesville, Florida, *Harbison*, no. 35 in Herb. Arn. Arb. as *Q. laurifolia*.

PLATE 1036, QUERCUS HEMISPHAERICA Bartram ex Willd., both figs. × 1: FIG. 1, fruiting branch, from Mayfield, Georgia, 1916, in Herb. Arn. Arb. as *Q. laurifolia;* FIG. 2, cups and acorn from vicinity of Eustis, Lake County, Florida, *Nash*, no. 1663, as *Q. Phellos*, in Herb. Arn. Arb. as *Q. laurifolia*.

PLATE 1037, STENANTHIUM GRAMINEUM (Ker) Morong: FIG. 1, portion of flowering plant, × 1, from Hendersonville, Henderson County, North Carolina, *Biltmore Herb.*, no. 5616[c]; FIG. 2, portion of leaf, × 2, from no. 5616[c]; FIG. 3, portion of fruiting plant, × 1, from "Pink Beds", 3500 feet alt., Pisgah Forest, North Carolina, *House*, no. 4040.

PLATE 1038, STENANTHIUM GRAMINEUM (Ker) Morong: FIG. 1, portion of inflorescence from near Merrifield, Virginia, *Allard*, no. 3234; FIG. 2, portion of leaf, × 2, from no 3234; FIG. 3, portion of fruiting inflorescence, × 1, from Pisgah Mountain, Buncombe County, North Carolina, *Biltmore Herb.*, no. 3501[b]; FIG. 4, portion of leaf, × 2, from no. 3501[b]; FIG. 5, portion of terminal fruiting raceme, × 1, from Springfield, Ohio, no. 11839, collector not stated; FIG. 6, portion of leaf, × 2, from same plant as FIG. 5.

PLATE 1039, STENANTHIUM GRAMINEUM, VAR. ROBUSTUM (S. Watson) Fernald: FIG. 1, portion of TYPE of *S. robustum* S. Watson, × 1, from Sligo Furnace,

Clarion County, Pennsylvania, August, 1859, *J. R. Lowrie;* FIG. 2, portion of leaf, × 2, from TYPE; FIG. 3, portion of terminal fruiting raceme, × 1, from Pleasant Grove, Pennsylvania, August 22, 1889, *Small;* FIG. 4, portion of leaf, × 2, from Pleasant Grove.

PLATE 1040, STENANTHIUM GRAMINEUM, VAR. ROBUSTUM (S. Watson) Fernald: FIG. 1, portion of inflorescence, × 1, from Beaver, Pennsylvania, *J. F. Mansfield;* FIG. 2, portion of leaf, × 2, from the *Mansfield* specimen; FIG. 3, summit of inflorescence, × 1, from New Texas, Lancaster County, Pennsylvania, Aug. 12, 1863, *Porter;* FIG. 4, terminal flowering raceme, × 1, from Armstrong County, Pennsylvania, 1868, *S. W. Knipe.*

PLATE 1041, STENANTHIUM GRAMINEUM, VAR. MICRANTHUM Fernald: FIG. 1, inflorescence, × 1, of TYPE, from Caesar's Head, South Carolina, July 28, 1881, *John Donnell Smith;* FIG. 2, portion of leaf, × 2, from TYPE; FIG. 3, portion of fruiting plant, × 1, from "Mts. Carol.", 1845, *Asa Gray.*

PLATE 1042, SISYRINCHIUM ANGUSTIFOLIUM Mill. and S. MUCRONATUM Michx. FIGS. 1 and 2, S. ANGUSTIFOLIUM: FIG. 1, *Bermudiana graminea, flore minore caeruleo* Dillenius, Hort. Elth. t. XLI, fig. 49, × 1, basis of *S. angustifolium;* FIG. 2, *S. anceps* Cavanilles, × 1. FIG. 3, S. MUCRONATUM Michx.: figure of *Sisyrinchium caeruleum parvum, gladiato caule, Virginianum* of Plukenet, Alm. 348, t. 41, fig. I, × 1, cited by Lamarck under his *S. gramineum.*

PLATE 1043, SISYRINCHIUM ANGUSTIFOLIUM Mill. and S. MONTANUM Greene, var. CREBRUM Fernald. FIGS. 1 and 2, S. ANGUSTIFOLIUM: portions of Bicknell's illustration of *S. graminoides* Bicknell, slightly reduced from Bull. Torr. Bot. Cl. xxiii, plate 263 (1896). FIG. 3, S. MONTANUM, var. CREBRUM: reduced from Bicknell's plate of *S. angustifolium* sensu Bicknell, not Miller, in Bull. Torr. Bot. Cl. xxiii. pl. 265 (1896).

PLATE 1044, SISYRINCHIUM MONTANUM Greene and var. CREBRUM Fernald, both × 1, FIGS. 1 and 2: portions of ISOTYPE of S. MONTANUM, from Mancos, Colorado, *Baker, Earle & Tracy,* no. 113. FIG. 3, var. CREBRUM: portions of TYPE.

PLATE 1045, HABENARIA CLAVELLATA (Michx.) Spreng.: FIGS. 1 and 2, TYPE of *Orchis clavellata,* × 1, after *Cintract* (note leaf—partly covered by label—with tip folded back); FIG. 3, leaf, × 1, from Blowing Rock, North Carolina, *B. L. Robinson,* no. 143; FIG. 4, leaf, × 1, from Dedham, Massachusetts, July, 1875, *E. H. Hitchings;* FIG. 5, leaf, × 1, from Southington, Connecticut, *L. Andrews,* no. 325; FIG. 6, leaf, × 1, from Southampton, Long Island, *St. John,* no. 2655.

PLATE 1046, H. CLAVELLATA, VAR. OPHIOGLOSSOIDES Fernald: FIGS. 1 and 2, portions of TYPE, × 1; FIG. 3, leaf, × 1, from Tignish, Prince Edward Island, *Fernald, Long & St. John,* no. 7228; FIG. 4, leaf, × 1, from Glenwood, Newfoundland, *Fernald & Wiegand,* no. 5208; FIG. 5, leaf, × 1, from Coffin Island, Magdalen Islands, *Fernald, Long & St. John,* no. 7229; FIG. 6, leaf, × 1, from Trepassey, Newfoundland, *Fernald, Long & Dunbar,* no. 26,534.

PLATE 1047, CLEISTES DIVARICATA (L.) Ames, all figs. × 1: FIGS. 1 and 2, median leaf and flower from southeast of Petersburg, Virginia (general type-region), *Fernald, Long & Smart,* no. 5742; FIG. 3, flower from Bennett, Cape May Co., New Jersey, June 20, 1909, *Witmer Stone, "in presence of S. S. Van Pelt, B. Long, O. H. Brown & Dr. J. W. Eckfeldt".*

PLATE 1048, CLEISTES DIVARICATA, VAR. BIFARIA Fernald, all figs. × 1: FIG. 1, upper half of plant, from the TYPE-SERIES, summit of Table-rock Mountain, Burke Co., North Carolina, *Small & Heller,* no. 285; FIG. 2, flower from Jacksonville, Onslow Co., North Carolina, *Moldenke,* no. 1246; FIG. 3, flower from back of Gatlinburg, Sevier Co., Tennessee, *A. N. Leeds,* no. 1139; FIG. 4, flower from Apalachicola, Florida, *B. F. Saurman;* FIG. 5, flower from Spring Hill, Alabama, *E. W. Graves,* no. 853; FIG. 6, flower from near Jacksonville, Florida, *A. H. Curtiss,* no. 4729.

PLATE 1049. FIGS. 1 and 2, SPECULARIA SPECULUM-VENERIS (L.) Tanfani: FIG. 1, lower half of plant, × 1, with characteristic basal branching (not merely

"branching above the middle"), from France, June, 1890, *S. E. Lassinome* (identification validated by *McVaugh*); FIG. 2, flowering summit, × 1, of same specimen. FIG. 3, SPECULARIA HYBRIDA (L.) A. DC.: portion of plant, × 1, to show characteristic basal branching (not merely "branching above the middle"), from Etruria, *Fiori* in Fiori & Béguinot, Fl. Ital. Exsicc., no. 1962bis (identification validated by *McVaugh*).

PLATE 1050. SPECULARIA COLORADOENSIS Buckl. = *Triodanis coloradoensis* (Buckl.) McVaugh, from specimens validated by McVaugh: FIG. 1, median third of plant, × 1, showing branching "above the middle" (not "branches, if any, from base or middle") and fruits "corymbiform aggregated" (not with "inflorescence spiciform") from New Mexico, *Chas. Wright*, no. 1432; FIG. 2, flowering inflorescence, × 1 (cf. PLATE 1049, FIG. 2) from plant raised by Asa Gray from Wright's seed.

THE GENUS LIATRIS

L. O. GAISER

(*Continued from page 183*)

Var. TYPICA, forma **montana** (Gray), comb. nov., spikes short, ca. 3 dm. long; basal leaves 2–4 dm. long, 1.5–2 cm. wide. Mostly from the mountains of North Carolina. *L. spicata* var. *montana* Gray, Synop. Fl. 1^2. 111 (1884), in part. VIRGINIA. BATH Co.: vicinity of Millboro (alt. 480 m.), Aug. 24, 1907, *E. S. Steele* (US); vicinity of Millboro (alt. 510 m.), Sept. 5, 1906, *E. S. Steele* (US). NORTH CAROLINA. MITCHELL CO.: Yellow Mt., *Curtis* (NY); Roan Mt., 1893, *H. A. Edson* (US); Little Roan Mt., (alt. 1800′), Sept. 9, 1892, *C. H. Merriam* (G, NY, US); Little Roan, July 19, 1880, *J. D. Smith* (US). BUNCOMBE Co.: Mt. Negro, July, 1841, *A. Gray & J. Carey* (G, type of *L. spicata* Willd. var. *montana* Gray); moist ground, slopes of Craggy Mt., July 13, 1897, Biltmore Herb., 579c (G, NY, US); wet hillside, vicinity of Montreat, Sept. 9, 1913, *P. C. Standley & H. C. Bollman* 10520 (US). HAYWOOD Co.: Frying Pan Gap & Big Baldy, Pisgah Forest (alt. 5000′–5300′), July 25, 1925, *P. A. Rydberg*, 9517 (NY). JACKSON Co.: damp rocks, summit of Devil's Court, House Peak (alt. 4800′), Sept. 1, 1882, *J. D. Smith*, 212 (US). SOUTH CAROLINA. PICKENS Co.: cliffs, Table Mt. (alt. 2600′), Aug. 1896, *J. K. Small* (NY). GEORGIA. DADE Co.: woods, Lookout Mt., July, 1893, *A. Ruth*, 658 (US).

Var. **resinosa** (Nutt.), comb. nov. A more slender, glabrous phase (hirsute only very exceptionally) from the drier barrens southward to the Gulf of Mexico: stems more slender than in var. *typica*, though frequently as tall, the upper two-thirds strict: leaves narrowly linear, the basal 2–4 dm. long and rarely exceeding 5 mm. in width, reduced upward quite abruptly: inflorescence spicate, 1.5–7 dm. long, when more elongated the heads sometimes scattered and the inflorescence loosely spicate: heads

cylindrical, usually of 4–7 flowers, sometimes up to 12, 8–12 mm. long and ca. 5 mm. thick at time of flowering; phyllaries usually correspondingly shorter than in var. *typica* but similarly appressed, sometimes glutinous and adherent, obtuse, with narrow scarious margin, frequently colored at time of flowering.—*Liatris resinosa* Nutt. Gen. ii. 131 (1818), not of DC.; Chapman, Fl. So. U. S. 192 (1860) and ed. 3, 211 (1897). *Liatris sessiliflora* Bertol. Misc. Bot. v. t. 2 (1846). *Laciniaria vittata* Greene, Pittonia, v. 57 (1902). *Liatris spicata* var. β Torr. & Gray, Fl. N. Am. ii. 73 (1841).

Pennsylvania to Tennessee, south to Florida and Mississippi.—PENNSYLVANIA. Bucks Co.: Without stated locality, 1882, *C. D. Fretz* (Q). Delaware Co.: Aston Mills, 1904, *F. W. Pennell* (US); serpentine, Williamson, Aug. 3, 1909, *F. W. Pennell*, 1413 (US). Lancaster Co.: vicinity of mouth of the Tucquan, Aug. 7, 1890, *J. K. Small* (US). MARYLAND. Baltimore Co.: near Baltimore, 1873, *Dr. E. Foreman* (US, NY); Catonsville, near Baltimore, Aug. 10, 1873, *Morong* (NY). DELAWARE. Newcastle Co.: gravelly roadside bank, w. of Chestnut Hill, 6 mis. s. of Newark, Elkton Rd., Sept. 9, 1937, *R. R. Tatnall*, 3532 (G). VIRGINIA. Sussex Co.: dry pinelands, about 4 mis. n. w. of Waverly, July 26, 1936, *M. L. Fernald & B. Long*, 6417 (G); damp woods, bordering Assamoosick swamp, about 2 mis. n. e. of Homeville, Aug. 24, 1938, *M. L. Fernald & B. Long*, 9171 (G). Dinwiddie Co.: open argillaceous low woods, just e. of McKenney, Oct. 13, 1941, *M. L. Fernald & B. Long*, 14035 (G). NORTH CAROLINA. Co. undetermined: eastern North Carolina, 1901, *F. M. Jones* (NY). Rowan Co.: Faith Post Office, Aug. 14, 1891, *J. K. Small & A. A. Heller*, 355 (G, NY, US, Q). Burke Co.: without stated locality, 1835, *Mr. Curtis* (NY). Buncombe Co.: rocky soil, on Cedar Cliff Mt., Aug. 17, 1904, *Biltmore Herb.*, 579k (US). Henderson Co.: swamps of Muddy Creek, Aug. 19, 1881, *J. D. Smith* (US); open woods, Aug. 21, 1881, *J. D. Smith*, 184 (US); summit, Devil's Peak, Apr. 1882, *J. D. Smith* (US). Haywood Co.: Looking Glass Rock, Pisgah Forest, Aug. 9, 1909, *H. D. House*, 4412 (US). Sampson Co.: pineland, near Roseboro, Aug. 5, 1938, *R. K. Godfrey*, 5716 (G). Onslow Co.: savannah, 12 mis. w. of Jacksonville, Aug. 6, 1938, *R. K. Godfrey*, 5739 (NY), savannah 8 mis. s. w. of Jacksonville, Sept. 1, 1938, *R. K. Godfrey*, 6465 (G). Pender Co.: Big Savannah, Sept. 4, 1924, *B. W. Wells* (NY). Bladen Co.: near Bladensboro, Sept. 3, 1908, *W. W. Eggleston*, 4028 (G, NY, US). New Hanover Co.: wet bog, near Wilmington, Sept. 8, 1927, *W. H. Munter* (G). Brunswick Co.: pineland, near Wilmington, Aug. 28, 1938, *R. K. Godfrey*, 6225 (G). Columbus Co.: pineland, near Hallsboro, Aug. 29, 1938, *R. K. Godfrey*, 6253 (G). SOUTH CARO-

LINA. GREENVILLE Co.: rocky hillside, Caesar's Head, *J. D. Smith*, Aug. 1881 (No. 185) (US), Aug. 5, 1881 (G); Caesar's Head, Aug. 10, 1881, *J. D. Smith* (US); Greenville, Aug. 2, 1881, *J. D. Smith* (US). CHESTERFIELD Co.: near MacBee, Aug. 1936, *W. Rhoades* (G). DARLINGTON Co.: sandhills, dry soil, Hartsville, July 27, 1920, *J. B. Norton* (US). FLORENCE Co.: in a dry sandy place, about 1 mi. w. of New Hope, Sept. 8, 1938, *R. Clausen & H. Trapido*, 3550 (NY). HORRY Co.: without stated locality, Oct. 8, 1934, *G. F. Tarbox* (NY); savannah, near Conway, Sept. 1, 1940, *P. O. Schallert* (G). GEORGETOWN Co.: grass-sedge upland bog or savannah, 5 mis. s. of Georgetown, Sept. 9, 1939, *R. K. Godfrey*, 8100 (G, NY). BERKELEY Co.: grass-sedge upland bog or savannah, 2 mis. w. of Jamestown, Sept. 11, 1939, *R. K. Godfrey*, 8182 (G, NY). GEORGIA. Without stated locality: *Dr. Boykin* (NY). HANCOCK Co.: Sparta, July 27, 1901, *Biltmore Herb.*, 579h (US). DODGE Co.: damp pine barrens, Eastman, Oct. 20, 1893, *C. Mohr* (US). SUMTER Co.: moist pine barrens, in s. e. part, Sept. 10, 1900, *R. M. Harper*, 620 (G, NY, US, B). WARE Co.: grassy pine barrens, Waycross, Aug. 23, 1900, *Biltmore Herb.*, 579e. (US). COLQUITT Co.: between Moultrie and Kingwood, Sept. 22, 1902, *R. M. Harper*, 1652 (G, US). THOMAS Co.: Thomasville, Oct. 16, 1903, *Mrs. Taylor* (G). FLORIDA. Without stated locality: *ex Herb. J. Torrey* (NY); *Leavenworth* (G); *Chapman* (G, NY). Co. UNDETERMINED: middle Fla., *Chapman*, 338 (NY). DUVAL Co.: swamp, pine barrens, Oct. 30, 1893, *A. Fredholm*, 394 (US); Jacksonville, Aug. 1896, *L. H. Lighthipe* (B); moist pine barrens, near Jacksonville, Oct. 15, 1894, *A. H. Curtiss*, 5311 (NY, US); Jacksonville, *A. H. Curtiss* (US). BAKER Co.: Glen Saint Mary, Oct. 1927, *H. H. Hume* (G). COLUMBIA Co.: flatwoods n. of Lake City, Oct. 15, 1893, *P. H. Rolfs* (F). LEON Co.: old field, Tallahassee, Oct. 20, 1942, *Henry & Beggs* (F). GADSDEN Co.: open pinelands, w. part of county, Aug. 30, 1931, *H. Foster* 114 (F). FRANKLIN Co.: swamps, near Apalachicola, Aug. 20, 1872, *Biltmore Herb.*, 579b (NY, US). BAY Co.: open moist ground, Lynn Haven, Oct. 12, 1921, *C. Billington* (US); Lynn Haven, Oct. 24, 1939, *R. A. Knight* (F). WASHINGTON Co.: Chipley, Aug. 31, 1942, *C. M. Senner* (F). WALTON Co.: boggy places, near Argyle, Oct. 2, 1901, *A. H. Curtiss*, 6923 (US, Q); moist soil, de Funiak Springs, Sept. 26, 1900, *Biltmore Herb.*, 579j (US). CLAY Co.: 5 mis. w. of Penney Farms, Sept. 22, 1939, *W. A. Murrill* (F). PUTNAM Co.: low pineland, along U. S. Hwy. 17, 10 mis. n. of Palatka, Sept. 24, 1940, *Ruth & West* (F). UNION Co.: wet shaded edge of flatwoods, 2 mis. n. e. of Lake Butler, Oct. 19, 1941, *W. A. Murrill* (F). ALACHUA Co.: flatwoods 3 mis. s. of La Crosse, Nov. 3, 1941, *W. A. Murrill* (F); low pineland, Fairbanks, Oct. 18, 1927, *G. F. Weber & E. West*

(F); along road to Fairbanks, Oct. 28, 1936, *H. K. Wallace & Miss L. Arnold* (F); swamp s. w. of Worthington Springs, Oct. 1945, *H. H. Hume* (F). Taylor Co.: open flatwoods, 14 mis. s. of Perry, Oct. 8, 1940, *W. A. Murrill* (F). Dixie Co.: flatwood, 3 mis. n. e. of Shamrock, Aug. 28, 1937, *Pasture Survey* (F); 5 mis. s. of Cross City, Oct. 8, 1940, *W. A. Murrill* (F). Flagler Co.: "Korona meadow", near route 1 n. of Ormond, Aug. 2, 1943, *Mrs. H. T. Butts* (G); low ground, US no. 1, Aug. 23, 1944, *Mrs. H. T. Butts* (OA); near Rwy., s. of Dupont, June 27, 1944, *Mrs. H. T. Butts* (OA); Rwy. ditch, s. of Bunnell, spring of 1944, *O. Ames* (OA); flatwoods, 10 mis. e. of co. line, Hwy. 28 near St. Johns Park, Oct. 10, 1940, *E. West* and *Miss L. Arnold* (F). Volusia Co.: flatwoods s. of Pierson, Sept. 17, 1943, *E. West & Miss L. Arnold* (F). Orange Co.: sand scrub, Windermere, Oct. 2, 1929, *F. Vasku* (F); flatwoods, Orlando, Oct. 9, 1929, *F. Vasku* (F); flatwoods, Vineland, Oct. 17, 1929, *F. Vasku* (F); low grassy pineland, Ft. Christmas, Sept. 24, 1927, *O. F. Burger & E. West* (F). Hernando Co.: near Bayport, July 15, 1919, *R. N. Jones* (US). Brevard Co.: in wet soil of prairie-like area in flatwoods, w. of Cocoa, Sept. 2, 1937, *A. S. Rhoads* (F). Manatee Co.: Bradentown, July 5, 1900, *S. M. Tracy*, 7078 (T); in moist ditch, Palma Sola along roadside, Aug. 19, 1945, *L. O. Gaiser, Mrs. H. T. Butts, Miss L. Arnold* (F). Osceola Co.: swamp, Oct. 12, 1903, *A. Fredholm*, 6086 (G). Okeechobee Co.: Okeechobee, Sept. 10, 1903, *A. Fredholm*, 5999 (G); in low pineland, 4 mis. e. of Okeechobee, Sept. 11, 1929, *H. O'Neill* (US). Collier Co.: prairie s. of Deep Lake, Dec. 7, 1925, *J. K. Small & W. M. Buswell* (NY). Dade Co.: in Everglades Key, Long Pine Key, Aug. 25, 1937, *Miss E. Scull* (F). TENNESSEE. Davidson Co.: Nashville, *Dr. Gattinger* (US). Coffee Co.: Tullahoma, *Biltmore Herb.*, Aug. 7, 1899 (No. 673), Aug. 20, 1897 (No. 579) (US); low woodland near Tullahoma, Oct. 2, 1902, *Biltmore Herb.*, 579n. (US). ALABAMA. Without stated locality: *Dr. Buckley* (G, NY), 1831, *Dr. Gates* (G, NY, B, isotypes of *L. sessiliflora* Bert.), 1878, *G. R. Vasey* (US). Co. undetermined: near the Wash, Retaei, common, low pine barrens, Oct. 1877, *C. Mohr* (NY). Marshall Co.: swamps near Albertville, July 10, 1899, *Biltmore Herb.*, 579m (NY). Cullman Co.: near Garden City, July 28, 1938, *H. K. Svenson*, 9418 (B). Lee Co.: Auburn, Aug. 11, 1897, *F. S. Earle & C. F. Baker*, 1160 (NY). Autauga Co.: wet pine barrens, w. of Autaugaville, Aug. 2, 1938, *H. K. Svenson & R. M. Harper*, 9505 (G); flat pine woods, 1 mi. n. e. of Autaugaville, Aug. 2, 1938, *R. M. Harper*, 3689 (G, NY, US). Bullock Co.: Culvers, Aug. 6, 1896, *C. Mohr* (US). Montgomery Co.: Pentulleh Creek, July 1884, *C. Mohr*, 16 (NY); dry open banks, Pentulleh, July 10, 1884, *C. Mohr* (US). Dallas Co.: open

swamp, along Mud Creek, w. of Selma, Aug. 1, 1938, *H. K. Svenson & R. M. Harper* 9790 (G). Baldwin Co.: Gateswood, *S. M. Tracy*, Oct. 30, 1903 (No. 8567) (G, NY, US, T), Oct. 30, 1903 (No. 8568) (ND), Oct. 31, 1903 (No. 8571) (ND). Mobile Co.: low flat pine barrens, Mobile, Oct. 10, 1871, *C. Mohr* (US); damp pine barrens, Aug. *Geol. Surv.*, *C. Mohr* (US); low pine barrens, Mobile, Sept., 1878, *C. Mohr* (US); damp pine barrens, Mobile, Oct. 1878, *C. Mohr* (US); pine woods, Mobile, Oct. *C. Mohr* (US); Mobile, *C. Mohr* (US); Chickahasa River, Mobile, Oct. 7, 1894, *C. S. Mohr & J. Sargent* (US); near swamp, w. of Spring Hill, Sept. 1918, *E. W. Graves*, 595 (US); pine barrens, Spring Hill, Aug. 1919, *E. W. Graves*, 731 (US). MISSISSIPPI. Jackson Co.: Ocean Springs, Aug. 31, 1891, *A. B. Seymour & F. S. Earle*, 132 (G), Aug. 31, 1895, *J. Skehan*, 2795 (G), Sept. 6, 1889, *F. S. Earle* (ND); swampy open pine barrens, Moss Point, Aug. 8, 1933, *O. Degener*, 4973 (NY). Harrison Co.: grassy pine barrens, near Mississippi City, Sept, 14, 1885, *J. D. Smith*, 426 (US); Biloxi, Sept. 3, 1900, *F. E. Lloyd & S. M. Tracy*, 488 (NY), Sept. 19, 1898, *S. M. Tracy*, 6350 (NY (ND, type of *Laciniaria vittata* Greene)), Aug. 23, 1898, *S. M. Tracy*, 4886 (US, NY), *S. M. Tracy* (US), Aug. 20, 1898, *S. M. Tracy*, 6353 (ND); in low pine clearing, Pass Christian, Sept. 1879, *A. B. Langlois* (ND, type of *Laciniaria elongata* Greene); Cuevas (albino), Sept. 8, 1900, *S. M. Tracy & F. E. Lloyd*, 579 (US).

Linnaeus, Sp. Pl. ii. 819 (1753), described *Serratula spicata* briefly as a plant with linear leaves, flowers sessile along a spike and a single stem. He based his diagnosis on a number of references, including that of Gronovius to Clayton's no. 237, from Virginia (Gron. Virg. 92 (1739)) and a Plukenet figure (Pluk. Alm. 190, t. 424, f. 6 (1696)), which is indeterminable. Of the other citations, the brief statement in Banister's catalogue (Banist. Virg. 1927 (1693)), though referring to something in the *spicata* group, is insufficient to determine the plant. Morison (Moris. Hist. iii. 137, t. 27 (1715)) quotes Banister but describes *L. squarrosa* and is cited by Linnaeus under both *L. spicata* and *L. squarrosa*, but in his second edition (1763) under *L. squarrosa* only. Dillenius' figure (Dill. Elth. 85, t. 72 (1732)) was drawn from a cultivated plant and shows a stout branching garden specimen probably similar to the plant of Gronovius. The leaves are distinctly ciliate at the base and the phyllaries are not obtuse. In the second edition, Linnaeus (Sp. Pl. ii. 1147 (1763)) added to his description of the leaves: "basi ciliatis" and likewise

referred to the second edition of Gronovius (Gron. Virg. 116 (1762)). *Liatris spicata*, as based on *Serratula spicata*, was described by Willdenow (Sp. Pl. iii. 1636 (1803)) with very little further elaboration on Linnaeus' description, except the statement that the bracts were linear and obtuse; and he again included all the same references.

There is in the Linnaean herbarium a specimen labelled *spicata*, a photograph of which Dr. Fernald kindly showed me, which Linnaeus had in 1753. It shows a plant mounted in two sections, each about 30 cm. long, with basal leaves about 9 mm. wide and an inflorescence 22 cm. long with heads almost 1 cm. long and not too crowded. Thus it agrees well with what is commonly called *Liatris spicata* as it grows in marshy places or as it is seen cultivated in flower-gardens.

Examination of a photograph of the Clayton specimen in the herbarium of the British Museum, also seen through the kindness of Dr. Fernald, shows a plant having turbinate heads with loose bracts, rather than cylindrical heads with appressed bracts. The inflorescence is of 9 heads along a short raceme or spike, about 2 cm. thick. The phyllaries appear oblong-oval. Only the uppermost leaves are present and these lengthen downward from short bracts ca. 12 mm. long subtending the basal heads to leaves about 3 cm. long. Fortunately there is also in the Gray Herbarium a small packet containing a head, labelled in Dr. Gray's hand: "*L. spicata L. Clayt.*" Examination of one floret of this showed the corolla-tube to be pilose within and the little bract subtending the head distinctly ciliate on the margin. In all these characters the Clayton specimen is quite different from that of Linnaeus and from what is now generally considered *L. spicata*, fitting rather what has been called *L. graminifolia*. The name *L. spicata*, then, is correctly based on the Linnaean specimen, exclusive of the Clayton plant and omitting that part of the description of the leaves by Linnaeus, "basi ciliatis", which probably was taken from the Clayton specimen.

Michaux (Fl. Bor. Amer. ii. 91 (1803)), citing *Serratula spicata* L. as a synonym, described *Liatris macrostachya*, as having a very long spike of sessile flowers with appressed involucral bracts. A photograph of his type seen at the Gray Herbarium agrees well with the Linnaean specimen. Pursh (Fl. ii.

507 (1814)) took up Michaux's *L. macrostachya* and brought Willdenow's *L. spicata* and Walter's *Anonymos graminifolius* into synonymy, thus confusing the identity of this long-spiked plant (see no. 7). Elliott (Sk. ii. 273 (1824)) chose Dillenius' figure to represent a variety of *L. spicata* with longer, narrower leaves and applied to it the varietal epithet *macrostachya*, taken from Michaux's species. DeCandolle (Prod. v. 130 (1836)) chose the same epithet for his var. β. Otherwise, *L. macrostachya* has been commonly regarded as synonymous with *L. spicata*, and so it seems from photographs of the type specimens it should be.

Torrey & Gray (Fl. N. Am. ii. 73 (1841)) and especially Gray (Syn. Fl. i². 111 (1884)) excluded Clayton's plant and interpreted *L. spicata* as the thick-spiked plant represented in Curtis's Bot. Mag. t. 1411 (1811), Brit. Fl. Gard. t. 49 (1823) and in the figure of Dillenius, Hort. Elth. t. 72, f. 83 (1732). As mentioned above, Dillenius' figure shows a large, branching plant of less spicate form with short leaves which are markedly ciliate at the base and probably represents a cultivated specimen of a plant similar to that of Gronovius.

Two varieties of *L. spicata* have been recognized that need to be considered here:

1. "var. β, heads about 5-flowered; plant smaller—L. resinosa Nutt., . . . not of DC." T. & G. l. c. ii. 73 (1841).
2. "var. *montana* Gray, low and stout . . . rocky mountain-tops in Virginia and N. Carolina, where it abounds." Gray, Syn. Fl. i². 111 (1884).

Referring first to the latter, there are specimens in various herbaria, of a wide-leaved, stout-stemmed but short-spiked mountain form of the Alleghanies. But from boggy places or by lakes in the mountains have come plants with very tall spikes and broad leaves, so that it has seemed faulty to include in a mountain variety only those individuals that had probably grown in more exposed and less favorable places, resulting in shorter spikes. Examination of collections from the North Carolina mountains (well represented at the National Herbarium), with study of their habitats, seems to confirm the water-loving nature of this species. Probably in dry habitats the spike often becomes reduced. So in *Biltmore Herb.*, no. 579d, from the slopes of Cedar Cliff Mt., Buncombe Co., North Carolina, one

specimen at the National and one at Queen's University Herbarium were found to be the low forms, while another specimen at the former herbarium and one at the New York Botanical Garden are hardly to be recognized as mountain specimens, resembling rather the usual var. *typica*. Those of reduced stature, if compared with those of normal var. *typica* from the same region, might represent an ecological variant or *forma*, but hardly merit varietal ranking. They have therefore been listed under var. *typica* as *f. montana*.

Nuttall, Gen. ii. 131 (1818), described a plant collected in the pine forests of North and South Carolina as *L. resinosa*, for the resiniferous glands that are sometimes conspicuous on the bracts (Type in the Banks Herbarium, a photograph of which was obtained by Mr. Weatherby). A glutinous condition of the buds of plants of var. *typica* from much further north is sometimes found, so that this characterization for a new species is not distinctive. However, the photograph of the type specimen bearing "Georgia" on the label, shows a very slender tall plant (more than three times the length of the herbarium sheet) with narrow long leaves and rather narrower lanceolate phyllaries. Furthermore, others have described what appear to be variants in the South of the tall-spiked plant of open swamps. Bertoloni, Misc. Bot. v. 10, t. 2 (1846), saw something new in slender plants collected in Alabama by *Gates* (isotypes in G, NY, and B) and named them *L. sessiliflora*. Greene, Pittonia iv. 315 (1901), also described *L. vittata* from a specimen from Mississippi, *S. M. Tracy*, no. 6350, near Biloxi, Harrison Co. Sept. 19, 1898 (ND). After examination of many specimens we have united these three as var. *resinosa* of *Liatris spicata*. The slenderer form, with long narrow leaves and fewer-flowered heads, has a more southern range, occurring southward chiefly from Virginia and Tennessee to Georgia, Florida and Alabama, in regions that may during the summer season become dry barrens. In Virginia and the Carolinas it is unusual to find *L. spicata* var. *typica* except near the mountain lakes, while the slender extreme is abundant, and is still more so in Georgia, Alabama and Florida, though both varieties occur. There are, of course, small differences in height, length of leaves and density of spike, in specimens from different localities throughout the entire range of the species, but generally

the southern extreme with narrow leaves and slender spike of 4–7-flowered heads having corolla-tubes without any pilosity, makes a true variety of *L. spicata*. In the northern latitudes of its range, when a specimen has grown in a location unfavorable for this marsh-loving species, the size of the heads and phyllaries and the thickness of the spike are often reduced so that one is reminded of specimens from Carolina, though the same long, narrow basal leaves may not accompany such depauperate forms. In most of the states where this slenderer variety and the thick-stemmed var. *typica* both occur there are present some confusing intermediates, frequently with very narrow leaves and yet larger heads of 12 and more flowers. Of these I have listed some below. Sometimes collections of the same collector's number and date comprise both varieties; as *A. H. Curtiss*, no. 6923, from boggy places near Argyle, Walton Co., Florida, Oct. 2, 1901, which at the National and Queen's Herbaria favor var. *resinosa* and at Gray var. *typica;* or *R. M. Harper*, no. 1652, from moist pine barrens between Moultrie and Kingwood, Colquitt Co., Georgia, Sept. 27, 1902, which at the New York Botanical Garden favors var. *typica* and at Gray and the National Herbaria var. *resinosa*. Intermediates seem frequently to occur in Florida. Likewise, some southern specimens suggest a variation in their long narrow phyllaries and very tall spikes, as *Biltmore Herb.*, no. 579m, from a swamp near Albertville, Marshall Co., Alabama, July 10, 1899 (NY). This kind of specimen was described by Greene (Pittonia, v. 57 (1902)) as *Laciniaria elongata*, type, *A. B. Langlois*, low pine-barrens at Pass Christian, Harrison Co., Mississippi, Sept., 1876 (ND). We have included all such under the one variety *resinosa*.

Intermediates between *L. spicata* var. *typica* and var. *resinosa*. —VIRGINIA. Sussex Co.: moist pinelands just southeast of Waverly, Sept. 10, 1937, *Fernald & Long*, 7660 (G). NORTH CAROLINA. Duplin Co.: savannah, 8 mi. west of Richland, Aug. 6, 1938, *R. K. Godfrey*, 5861 (G). Carteret Co.: pineland near sea-level, Sept. 1, 1938. *Godfrey*, 6405 (G). Pender Co.: savannah near Burgaw, Aug. 7, 1938, *Godfrey*, 5922 (G). GEORGIA. Warren Co.: Warrentown, July 24, 1910, *Biltmore Herb.* 579g (NY, US). FLORIDA. Duval Co.: moist pine-barrens near Jacksonville, Nov., *A. H. Curtiss* 1178 (G, NY). Wakulla Co.: St. Marks, Sept. 3, 1895, *G. V. Nash* 2542 (G, NY, US, ND). Volusia Co.: Deland Road, near

Daytona Beach, Aug. 16, 1943, *Mrs. H. T. Butts* (G, OA). ALABAMA. Cullman Co.: Cullman, July 24, 1900, *Biltmore Herb.* 579f (US).

The few native specimens of this complex from Louisiana which have been seen resemble var. *resinosa* rather than var. *typica* but they are quite pubescent. Of two specimens, Aug. 11, 1919, and Sept. 1, 1922, Bro. *G. Arsène*, no. 11207 and no. 12517 respectively, from Sulphur Springs, vicinity of Covington, St. Tammany Parish (US), the latter is similar to var. *resinosa* with a moderately hirsute stem, while the former is more densely so. A very hirsute condition does not usually go with *L. spicata*. Deam (Flora of Indiana, p. 912) states: "The rachis of all my plants is quite glabrous. Kriebel's no. 3958, from Greene Co., has the rachis closely puberulent". In the examination of many specimens pubescence has but rarely been encountered elsewhere. Of the three Gates specimens from Alabama, which are the isotypes of Bertoloni's *L. sessiliflora*, the one at the Gray Herbarium is the only one to have hirsute foliage; it was mentioned by Gray (Synop. Fl. i^2. 111 (1884)). Also on two sheets of collections from the Carolinas, both hirsute as well as glabrous plants are found; Aug. 29, 1938, *R. K. Godfrey*, no. 6253 from pineland near Hallsboro, Columbus Co., N. C. (G), and Sept. 11, 1939, *R. K. Godfrey*, no. 8182, 2 mis. w. of Jamestown, Berkeley Co., S. C. (G). In the recently seen herbarium of the University of Florida, in which are represented collections from eighteen counties of that state, variations from a few scattered cilia at the base of the leaves to densely pilose leaves and stems were found in four specimens from Alachua county and one each from Dixie, Union, Manatee and Leon counties. Since such varying degrees of pubescence were witnessed in plants from one locality it seemed that exceptional hirsute individuals of the generally glabrous *L. spicata* must be included in var. *resinosa*. *L. Garberi*, which is the truly hirsute species of the series *Spicatae*, occurs in the southern half of the peninsula, beginning to appear just about where *L. spicata* leaves off.

Greene (Pittonia, iv. 315–16 (1901)) described *Laciniaria serotina* from a specimen of *A. B. Langlois*, Nov. 8, 1885, from Covington, St. Tammany, Louisiana (ND), as a plant with a slender stem covered with hairs and having ovate outer phyllaries with

ciliate margins and inner oblong ones with acute tips. It is of course possible that a few such mutations might occasionally arise. However, examination of a specimen of Aug. 20, 1903, *S. M. Tracy,* no. 8533, from Mendenhall, Mississippi (G, T) which resembles *L. pycnostachya* but shows only slightly recurved bracts while in other respects it is almost a match for the Louisiana *resinosa*-like plants, suggests that these may represent intergrades with another species, as *L. pycnostachya.* They seem to make a series of intermediates between typical southern *L. spicata,* as can be seen in the Gates specimen (G, NY, B) or that of Oct. 30, 1903, of *S. M. Tracy,* no. 8567, from Gateswood, Baldwin Co., Alabama (G, NY, US, T), and *L. pycnostachya* Michx. (see no. 6). The suggestion of some hybridity seems more plausible since in Florida some plants approaching these have slightly ciliolate bracts and also pilosity in the corolla-tube, which is lacking in *L. spicata* but present in members of the *Graminifoliae* series. Such is a specimen of Oct. 8, 1930, *F. S. Blanton & H. O'Neill,* no. 6820, from low pineland, at edge of swamp, 10 mis. n. w. of Antioch, Pasco Co., Florida (US). In another collection of Sept. 3, 1895, of *G. V. Nash* no. 2542, from St. Marks, Wakulla Co., Florida, the specimen at the New York Botanical Garden has a hairy corolla and the one at Notre Dame is smooth. Until more specimens have been collected that would confirm recognizing the pubescent plants as a distinct species or variety we have considered them here as exceptional or as intermediates; and this includes Greene's *Laciniaria serotina* which is left under the doubtful species.

There is also some evidence in the southeastern coastal plain, as from south Maryland to Georgia where representatives of the *Graminifoliae* abound, that intergrades between them and *L. spicata* may occur. The collection of Oct. 4, 1929, *J. H. Pyron,* from Princeton, Clarke Co., Georgia (P) which has a stalk 93 cm. tall, with long slender leaves and a spike 2.5 cm. in diameter, has heads a little turbinate and corolla-tube slightly hairy, similar to *L. graminifolia.* A similar specimen of Sept. 15, 1916, Bro. *F. Hyacinth,* no. 950, Amendale, Prince George Co., Maryland (P), is another that looks tall and stiff like *L. spicata* and yet has a hairy corolla-tube. A specimen of Oct. 11, 1912, *F. W. Pennell,* no. 4852, from sandy pineland, Yemassee, Hampton Co., South

Carolina (NY, P), while resembling the southern *L. spicata* var. *resinosa* in general, shows a hairy corolla and acute bracts that suggest *L. regimontis*.

A modified specimen, such as that described by Farwell as *Lacinaria spicata* var. *foliacea* (Amer. Mid. Nat. ix. 260 (1925)), was found by the writer when collectiong on Squirrel Is., in the St. Clair River, Lambton Co., Ontario, and is considered to be the result of a plant of var. *typica*, found there at the northern limit of its range, having had the spike broken when young, perhaps by grazing cattle, thus stimulating greater growth of the remaining basal heads, their pedicels and the subtending bracts.

In this species also, the white-flowered form seems to have been noticed fairly frequently and was first recognized as *Liatris spicata* forma *albiflora* by Britton (Bull. Torr. Bot. Club, xvii. 124 (1890)), but as the albino has occurred in many of the other species, no special recognition of it is here made.

Hereafter is described a hybrid from the northern limit of the range of *L. spicata* var. *typica*.

× Liatris **Steelei,** hybr. nov. (*L. spicata* × *sphaeroidea*), caulibus erectis glabris ca. 8.5 dm. altis e cormo compresso 3 cm. lato 2 cm. alto; foliis radicalibus argute lanceolatis 36 cm. longis 2 cm. latis, petiolo anguste alato longitudine tertiam partem laminae aequante, foliis caulinis basem versus radicalibus similibus ca. 20 cm. longis, superne ad folia lineari-lanceolata vel linearia 10–1 cm. longa 3–1 mm. lata abrupte reductis; inflorescentia e spica laxa 20–40 cm. longa; capitulis 20–25-floris sessilibus vel breviter pedicellatis 1–1.5 cm. longis anthesi 1–1.2 cm. latis tunc subturbinatis; phyllariis glabris plerumque herbaceis, exterioribus ovatis vel oblongis marginibus scariosis angustis, medianis interioribusque oblongo-linearibus apice rotundato conspicue scarioso coloratoque; corolla purpurea, tubo 7 mm. longo intus piloso; achaeniis 5 mm. longis, pappo barbellato 6 mm. longo.—INDIANA. Porter Co.: on and among dunes, Dune Park (alt. 175–200 m.), Sept. 17, 1909, *E. S. Steele* 169 (US 609031, type, 609030, isotype).

These two plants were observed to resemble *L. spicata* var. *typica* but to vary in their larger heads of more flowers and broader phyllaries with scarious, rather crisped margins. The leaves too are sharply lanceolate rather than linear-lanceolate as found in that species.

These variations in characters suggested relationship to mem-

bers of the *Scariosae* series and a search was made through the Steele collection. A specimen of × *L. sphaeroidea*, collected at the same time and place was discovered--no. 162b (US609017). As other specimens of this latter hybrid have come from this region of Indiana it seems quite likely that they represent one parent of the new hybrid. As discussed (see no. 18) × *L. sphaeroidea* has come to be quite a stable unit and has probably been a parent of other hybrids as well. Though no specimen of *L. spicata* from the very same location was found, in the collection there is, surprisingly enough, one of Sept. 20, 1909, of E. S. Steele, no. 181, from the old beaches, Lake Chicago, Buffington to Pine, Lake Co., Indiana (US 609098), with the typical, long, linear leaves and usual heads of about 10 flowers of *L. spicata*. Thus presumably the second parent-species grew at least in the region and perhaps even in the near-by vicinity at the time of collection of the hybrid plants.

2. Liatris lancifolia (Greene) Kittell. A thick-stemmed glabrous plant 6 dm. high resembling *L. spicata* var. *typica:* leaves numerous; basal ones 2–3 dm. long and 1–1.5 cm. wide in the center from which they taper equally to the base and obtuse tip; upper leaves shorter and bluntly lanceolate: inflorescence a dense or loose spike 1.5–3 dm. in length and 2–3 cm. in diam.; heads ca. 12-flowered; phyllaries erect, glabrous, the outer triangular-ovate, the inner oblong and acute, mostly herbaceous, with narrow purplish ciliolate margins; corolla purple, 6 mm. long, smooth within; achene (immature) at least 3 mm. long; pappus 5 mm. long.—Tidestr. & Kittell, Fl. Arizona and New Mexico, 370 (1941). *Laciniaria lancifolia* Greene, Bull. Torr. Bot. Club xxv. 118 (1898). *Lacinaria kansana* Britt., Man. 927 (1901). *Liatris kansana* Rydb., Fl. Prairies & Plains Central N. Amer. 781 (1932).

Along river-bottoms from S. Dakota to Colorado and in the mountains of New Mexico.—STATE UNDETERMINED. *J. D. Cooper* (NY). SOUTH DAKOTA. Union Co.: Wallace, Aug. 16, 1892, *S. Dak. Agr. Exp. Sta.* (US). NEBRASKA. Co. Undetermined: Aug. 9, 1899, *J. H. Holms* (US). Keyapah Co.: Carns, Aug. 18, 1893, *F. Clements*, 2892 (G, US). Scottsbluff Co.: Platte Bottom, w. of Scottsbluff, Aug. 3, 1891, *P. A. Rydberg*, 139 (NY, US). Kearney Co.: Platte Valley at Fort Kearney, July 1891, *H. Hapeman* (US). KANSAS. Riley Co.: prairie, Aug. 7, 1895, *J. B. Norton*, 215 (G, NY, US). Ford Co.: bottoms, south of river, Dodge City, Aug. 19, 1890, *B. B. Smyth*, 163 (NY, type of *Lacinaria kansana* Britt., US). WYOMING.

Goshen Co.: moist meadows, Pratt, Aug. 1912, *A. Nelson*, 9667 (G). COLORADO. Co. Undetermined: Platte,[1] *Fremont* (NY). Yuma Co.: Wray, Aug. 16, 1907, *H. L. Shantz* (NY). NEW MEXICO. Chaves Co.: Roswell, South Spring R. (alt. 3800′), Aug. 25, 1900, *F. S. Earle & E. S. Earle*, 258 (NY, US); Roswell, South Spring R., Aug. 25, 1900, *F. S. Earle* (ND). Lincoln Co.: in marshy land, south fork of Tularosa Creek, White Mts. (alt. 6800′), July 31, 1897, *E. O. Wooton*, 254 (G, NY (ND type)). Otero Co.: along Tularosa Creek, Aug. 18, 1899, Aug. 6, 1901, *E. O. Wooton* (US); Tularosa Creek, 3 mis. s. of Mescalera agency, July 19, 1928, *C. B. Wolf*, 2795 (G); rather swampy meadows, Mescalera Indian Reserv., Aug. 2, 1931, *W. Huber* (P).

Essentially the same basic characteristics are common to *L. spicata* var. *typica* found in the states east of the Mississippi and to *L. lancifolia* which was described from marshy land in the White Mountains of New Mexico. The width of the leaves of the latter, described by Greene, l. c. as "broad in proportion", is somewhat unusual for a member of the *Spicatae* series, though similar to *L. spicata* var. *typica* f. *montana*. *Lacinaria kansana* Britt. was described from a plant from river-bottoms in Kansas as having also blunter leaves. Rydberg l. c. treated *Liatris kansana* as a species occurring rather infrequently from S. Dakota to Colorado, i. e. in the western plains states.

When the New Mexico specimens are compared with those of the neighboring plains and allowance is made for some modification due to mountain habitats, the forms seem hardly distinguishable. In both, the corolla-tube is smooth within so that one might consider these geographically separated segregates as varieties of *L. spicata* but for their separation by the expanse of the central plains states from the rest of that species. We are here considering the two as one species, *L. lancifolia* (Greene) Kittell.

The species is readily separated from *L. pycnostachya* Michx., a common species in the western plains, by the appressed rather than recurved phyllaries. Occasional material is suggestive of a condition intermediate between the two, as the collection of 1861, *T. J. Hale*, Trempealeau, Trempealeau Co., Wisc. (G), with acute and ciliate-margined though erect phyllaries or those

[1] In the Report of Fremont's Expedition, Washington, 1845, the reference on page 90 of the Catalogue of Plants to "L. spicata (Willd.) north fork of the Platte Sept. 4" is probably to this specimen.

of Aug., 1892, *ex Herb. J. J. Thornber*, Brookings, Brookings Co., S. Dak. (G), and of Sept. 3, 1891, *ex Herb. J. M. Bates*, Valentine, Cherry Co., Neb. (G), both having phyllaries that, though not recurved, are loose rather than appressed and have petaloid margins. As there was some pilosity within the corolla-tubes, confirmation of intergradation is given and may even suggest that it be between *L. lancifolia* and some species of the plains other than *L. pycnostachya* since that usually shows none or very few hairs in the tube.

3. Liatris microcephala (Small) K. Sch. Stems commonly tufted, slender, striate, glabrous, 3–7 dm. tall, from a small ovoid or subglobose corm, usually not more than 3 cm. in diameter; leaves numerous, linear, glabrous with very few hairs along mid-vein or margin, the basal 5–10 cm. long, 2–3 mm. wide, the upper gradually reduced to the base of the inflorescence: heads in lax slender racemes, quite numerous, 4–6-flowered, cylindrical, somewhat narrowed, but not acutely, at the tips, ca. 8 mm. long, slender, on short, slender, erect peduncles about equalling them in length; phyllaries glabrous, appressed, obtuse, the outer ovate, the inner oblong, with only minutely ciliolate or merely slightly scarious margins, 5–6 mm. long: corolla-tube 5–6 mm. long, purple, lacking any pilosity within; achenes 3–4 mm. long; pappus short, 3.5–4 mm. long, about half as long as the corolla-tube, not plumose to the naked eye (i. e. with barbellate bristles). —Just, Bot. Jahresb. xxvi. pt. 1, 378 (1900). *Lacinaria microcephala* Small, Bull. Torr. Bot. Club xxv. 473 (1898); Man. S. E. Fl. 1334 (1933). *Laciniaria polyphylla* Small, Fl. Southeastern U. S. 1173, 1338 (1903).

On sandstone outcrops and dry barrens in North Carolina, Tennessee, Kentucky, Georgia and Alabama.—NORTH CAROLINA. Polk Co.: Tryon, near Columbus, Aug. 4, 1897, *E. C. Townsend* (US); Tryon, Aug. 11, 1921, *D. C. Peattie*, 1154 (NC). Henderson Co.: Flat Rock, Aug. 24, 1881, *J. Donnell Smith* (NY). GEORGIA. Co. Undetermined: in shade of mountains, 1836, *Drummond*, 173 (NY). Rabun Co.: canyon, Tallulah Falls (alt. 1600′), Aug. 16, 1893, *J. K. Small* (G, NY, US). de Kalb Co.: on slopes and summit of Stone Mt. (alt. 1000′–1686′), Sept. 6–12, 1894, *J. K. Small* (G (NY, type of *Laciniaria polyphylla* Small), US); Stone Mt., *Biltmore Herb.* Sept. 8, 1897 (No. 4117a), Sept. 1, 1899 (No. 14936a) (NY); Stone Mt.; *L. R. Gibbes* (NY), Sept. 1876, *W. M. Canby* (G); turf, rocks, n. w. base of Stone Mt., Aug. 17, 1927, *K. M. Wiegand & W. E. Manning*, 3175 (G); rocky soil, Aug. 2, 1912, *F. W. Pennell*, 4064 (US, P). Rockdale Co.: 6 mis. s. w. of Logansville, Big Haynes Cr., Oct. 18, 1936, *J. H. Pyron & R.*

McVaugh, 1126 (US). KENTUCKY. Co. UNDETERMINED: Mts. of Kentucky, Lexington, 1837, *C. W. Short* (NY). MC CREARY Co.: on sandstone and sand, along South Fork, Cumberland R., Sept. 16, 1934, *E. Lucy Braun* (G); along sandy shores of Upper Cumberland R., Sept. 13, 1940, *F. T. McFarland & H. J. Rogers*, 88 (G). TENNESSEE. Co. UNDETERMINED: on rock, e. Tenn. MacFarlands, *A. Ruth*, 1896 (No. 3762), 1897 (No. 5804) (NY). DAVIDSON Co.: Nashville, 1878, *Dr. A. Gattinger* (P). MORGAN Co.: sandy margin of stream, Rugby, Aug. 19, 1930, *H. K. Svenson*, 4094 (G, P, B); moist sandy glade, n. of Hoffman, Sept. 11, 1927, *E. T. Wherry & F. W. Pennell*, 13942 (P). COCKE Co.: 3 mis. s. of Wolf Creek Sta., Aug. 30, 1897, *T. H. Kearney*, 746 (US). CUMBERLAND Co.: gravelly oak woods, 6 mis. e. of Crossville, Aug. 15, 1930, *H. K. Svenson*, 4173 (G, B); Ozone, July 14, 1929, *W. A. Anderson*, 1402 (G), *H. M. Jennison & W. A. Anderson* (G, O without No.); sandy soil, mountain-top, Aug. 24, 1890, *D. C. Coffman* (US). VAN BUREN Co.: dry sandy ledge, bluff overlooking Can Creek Falls, July 19, 1935, *J. K. U. Sharp & A. J. Sharp*, 2955 (P). COFFEE Co.: dry oak-barrens, n. of Manchester, *H. K. Svenson*, Aug. 6, 1938 (No. 8987) (G, B), Aug. 8, 1940 (No. 10607) (B); near Tullahoma, Sept. 24, 1933, *E. J. Alexander, T. H. Everett & S. D. Pearson* (NY). FRANKLIN Co.: Sewanee, 1897, *K. Selden*, 311 (NY, F); sandstone rocks, St. Andrews, July 15, 1938, *H. K. Svenson*, 9583 (G, B). ALABAMA. Co. UNDETERMINED: in tufts on rocks, on the summit of mts., July 29, 1896, *C. Mohr* (US). DE KALB Co.: falls, above Valley Head, Sept. 20, 1899, *Biltmore Herb.*, 14936b (NY). MARSHALL Co.: rocky glades, along Short Creek, 5 mis. n. e. of Boaz, Aug. 29, 1933, *R. M. Harper*, 3103 (G, NY, P, US). ETOWAH Co.: on sandstone rocks, above Noccalula Falls, Lookout Mt., Aug. 31, 1911, *R. M. Harper*, 149 (G, NY, US). CULLMAN Co.: Cullman, Sept. 9, 1897, *H. Eggert* (NY, ND, US); rocky glade, St. Bernard, Sept. 15, 1937, *Rev. Gattman* (NY, P). CALHOUN Co.: on granitic rocks, dry hills, near Anniston & Chandler Springs, Sept. 20, 1892, *C. Mohr* (US). TALLEDEGA Co.: Blue Mts., Sept. 24, 1893, *C. Mohr* (NY). AUTAUGA Co.: flat pine-woods, n. e. of Autaugaville, Aug. 31, 1930, *R. M. Harper* (G, P); dry gravelly banks in open exposed places, banks of Autauga Creek, near Prattville, July 18, 1880, *C. Mohr* (US). MONROE Co.: in mts., near Franklin, 1843, *Rugel* (NY).

Although fire in the Herbarium of the University of Tennessee destroyed the type from which Small described *Lacinaria microcephala* (Dr. A. Gattinger 1888, in the Cumberland Mts. Tennessee), observation of many specimens from this region in various herbaria confirms its identity as a distinctive species.

Liatris microcephala has been frequently confused with *L. graminifolia*, probably because of a general similarity in size of plant and the somewhat similar distribution of heads. However, the prominent cilia found along the margins of the petiole in the latter species are lacking in the almost glabrous leaves of *L. microcephala*. The number of flowers in a head are also much fewer in this species and make a slender cylindrical head, whereas in *L. graminifolia* the head is thickened in bud and becomes more turbinate upon opening. Upon examination of the corolla-tube with a lens it is found to be clear in *L. microcephala*, as in *L. spicata*, whereas in *L. graminifolia* considerable pilosity is seen. It is by these characters that *L. microcephala* has been placed with the *Spicatae* rather than with the *Graminifoliae*.

4. LIATRIS ACIDOTA Engelm. & Gray. Corm globose or slightly elongated, usually not more than 3 cm. in diameter, bearing a tuft of fibres, the remnants of previous basal leaves, as seen also in *L. spicata* and *L. pycnostachya:* stems slender but stiffly erect, 5–8 dm. tall, glabrous or puberulent, arising singly in young, but to the number of three or four in older plants: basal leaves very long, glabrous, linear-lanceolate, 2–4 dm. long, 3–5 mm. wide, those of the slender spikes narrowly linear becoming abruptly shortened, erect and bract-like: heads numerous, loosely covering 10–20 cm. of the erect spikes, 3–5-flowered, cylindrical but narrowed acutely at the tip when in bud, about 1 cm. long; phyllaries few, glabrous, appressed, the outer ovate, the inner oblong-lanceolate, sometimes becoming purplish; corolla about 8–10 mm. long, phlox purple, lacking any pilosity within the tube; achene 4–5 mm. long; pappus ca. 7 mm. long, not plumose to the naked eye (i. e. with barbellate bristles).—Pl. Lindh. i. 10 (1845); Boston Jour. Nat. Hist. v. 218 (1845); Gray, Pl. Wright. i. 83 (1852), in part. *L. mucronata* sensu Torr. & Gray Fl. N. Am. ii. 70 (1841) not DC. *Lacinaria acidota* O. Ktze., Rev. Gen. i. 349 (1891); Bush, Amer. Mid. Nat. xii. 318 (1931). *Lacinaria Halei* Small, Bull. Torr. Bot. Club, xxvii. 281 (1900). *Liatris acidota* var. *vernalis* Engelm. & Gray, Pl. Lindh. i. 10 (1845). Probably *Lacinaria brachyphylla* Bush, Amer. Mid. Nat. xii. 317 (1931).

Coastal plain region of Texas and Louisiana.—TEXAS. Without stated locality: 1843, *Lindheimer*, 73 (G); Apr. 1842, *Lindheimer* (P); Sept. 1842, *Lindheimer* (G); 1836, *Drummond*, 171 (G, paratype), *Drummond*, 146 (G, paratype); *C. Wright* (G, P), 155 (US); Sept. 1850, *G. Thurber* (G, NY, P). Co. undetermined: wet prairies, Houston to the Brazos, 1843, *Lindheimer*, 72 (G, type) (P). TRINITY Co.: 4 mis. e. of Riverside, Sept.

29, 1934, *V. L. Cory*, 10476 (G). Newton Co.: 16 mis. s. of Newton, Oct. 4, 1934, *V. L. Cory*, 10966 (G, US); 21 mis. n. of Dewbeyville, Oct. 4, 1934, *V. L. Cory*, 10966 (G). Hardin Co.: 2.6 mis. e. of Camp Jackson, Sept. 13, 1936, *V. L. Cory*, 19799 (G, T); 7 mis. n. of Silsbee, *V. L. Cory*, 20036 (G); Kountze, Aug. 5, 1939, *H. R. Reed*, 30 (G). Tyler Co.: without stated locality, July 22, 1939, *B. C. Tharp* (G). Liberty Co.: Stilson, Sept. 3, 1923, *B. C. Tharp*, 2633 (US); Cleveland to Dayton, Sept. 9, 1937, *B. C. Tharp* (G). Harris Co.: pine woods, Houston, Aug. 9, 1921, *R. Ferris & C. D. Duncan*, 3266 (NY, P); Houston, July 23, 1915, *G. L. Fisher*, 1720 (US); Houston (specimen to right), 1915, *E. J. Palmer*, 8577 (P): Bammel Ranch (very abundant), July 18, 1925, Oct. 1, 1925, *H. Ness* (T); prairies, Harrisburg, 1874, *J. F. Joor* (US); Harrisburg, Sept. 2, 1875, Oct. 1894, *J. F. Joor* (US); Seabrook, Aug. 11, 1913, *G. L. Fisher*, 663 (US). Waller Co.: without stated locality, Aug. 14, 1898, *F. W. Thurow*, 12 (US). Austin Co.: without stated locality, Oct. 15, 1939, *B. C. Tharp* (G). Jefferson Co.: Vidor, Sept. 1, 1923, *B. C. Tharp*, 2641 (US). Chambers Co.: coastal prairies, Sept. 3, 1924, *B. C. Tharp*, 3179, 3180 (US). Galveston Co.: 13 mis. n. w. of Galveston, Aug. 4, 1939, *H. R. Reed*, 28 (G). Brazoria Co.: 12 mis. s. of Alvin, Dec. 6, 1918, *H. C. Hanson* (NY, P). Matagorda Co.: moist sandy soil, along Rwy. s. of Van Vleck, Sept. 20, 1913, *F. W. Pennell*, 5512 (NY, P); 6.8 mis. w. of Palacios, Oct. 18, 1936, *V. L. Cory*, 20279 (G). Jackson Co.: Edna, Dec. 9, 1930, *J. A. Drushel*, 6847 (US); El Toro, Nov. 11, 1931, *J. A. Drushel*, 8837 (US). Calhoun Co.: Port Lavaca, July 2, 1939, *B. C. Tharp* (G). LOUISIANA. Without stated locality: *Hale*, 334 ((G, unnumbered), (NY, type of *Lacinaria Halei* Small) P). Calcasieu Co.: low moist grassy field, along Rwy., 1 mi. e. of Lake Charles, July 20, 1938, *D. S. Correll & H. B. Correll*, 9638 (G); Lake Charles, Aug. 25–Sept. 10, 1938, *K. K. Mackenzie*, 475 (NY, P); Lake Charles, Aug. 7, 1897, *S. M. Tracy*, 3448 (NY, P); Lake Charles, Sept. 1906, *R. S. Cocks*, 2922 (ND).

Liatris acidota was described by Engelmann and Gray in 1845 (Pl. Lindh. i. 10), when they distinguished it from De Candolle's earlier species *L. mucronata* (Prodr. v. 129 (1836)). However, the two species are still confused and sometimes as well with *L. punctata*.

The type of *L. mucronata* is a plant collected Nov. to Dec., 1828, by Berlandier, no. 1926, in Texas (Herb. Geneva; isotypes in G, NY). Torrey & Gray (Fl. N. Amer. ii. 70 (1841)) maintained *L. mucronata* and referred to it other specimens collected by Drummond, no. 171, and no. 146, from Texas (G), and by

Hale from Louisiana (G, NY). When Engelmann and Gray described *L. acidota* from a plant of Lindheimer's collections, no. 72, from wet prairies, Houston to the Brazos (G, NY), they selected as similar to it, the Drummond and Hale specimens. A spring-blooming plant collected by Lindheimer, no. 73, near Houston (G), was made *L. acidota* var. *vernalis*. However, they recognized their species as distinct from De Candolle's and wrote (l. c. page 10) as follows:

"In the Flora of North America, this species, which is apparently common in western Louisiana and Texas, was hesitatingly referred to *L. mucronata* DC., from the character of which it differs in some respects, principally in the form of the involucral scales. But among Lindheimer's plants, some specimens of what is no doubt the true *L. mucronata* DC. occur (which have been distributed in some sets probably mixed with *L. acidota*) and which render it clear that the present is a different, although very nearly allied species".

Then in Gray, Synop. Fl. i^2. 110 (1884), *L. acidota* was retained, not in the sense of Engelmann & Gray, but of *L. mucronata* of Torrey & Gray. True *L. mucronata* was reduced to a variety, to which other Texas plants were referred. Specimens collected in 1849 by Lindheimer, no. 940, in the neighborhood of Comanche Spring and in 1850, no. 941 at New Braunfels, were so named in the 18th report of the Missouri Botanical Garden (1907). Thus there was continued an association of *L. mucronata* and *L. acidota* that is hardly justifiable when the type specimens are examined. De Candolle in describing *L. mucronata* referred only to Berlandier's specimen which, by following the route travelled by Berlandier (Geiser, Naturalists of the Frontier, Chap. III (1937)), was probably collected between Boerne and Comfort, in what is now Kerr and Kendall counties, of the blackland prairie region of Texas. Engelmann and Gray stated clearly, when describing *L. acidota*, that it came from the wet prairies "from Houston to the Brazos" (in the case of Lindheimer's plant), "western Louisiana" (in the case of Dr. Hale's plant); and, as Drummond's letters to Hooker (Hook, Journ. Bot. i. (1835)) indicate that Drummond spent most of his time collecting in a region inland from Galveston, that plant too would have come from the wet coastal plain region. All the specimens I

have seen that conform to the type of *L. acidota* have come from the coastal plain area.

The authors' original descriptions further differentiate the two species:

	L. acidota	*L. mucronata*
spike:	elongate, strict	strict
heads:	3-flowered	5-flowered
bracts:	oblong-lanceolate, outer ovate, gradually becoming acuminate, cuspidate	ciliate, obtuse, abruptly mucronate

Further examination of the specimens emphasize such differences as these:

height:	4–6 dm.	3–4 dm.
rachis:	glabrous, almost naked	leafy
basal leaves:	very elongate, diminishing abruptly	not noticeably longer and gradually diminishing
upper leaves:	erect, short, almost subulate bracts	progressively shorter leaves
corolla tube:	smooth inside	pilose within
pappus:	not plumose to the naked eye (i. e. with short lateral cilia)	plumose to the naked eye
achene:	3 mm. long	5 mm. long

Thus it seems that by the nature of the pappus alone the two species fall each into a different section of the genus, *L. acidota* in *Suprago*, and *L. mucronata* in *Euliatris*. Not only to this latter section but also to the same *Punctatae* series, belongs *L. angustifolia* Bush, and in the discussion of that species (see no. 27) will be found further reference to the confusion of *L. acidota*-like plants with *L. mucronata* and *L. angustifolia*.

In 1900 Small described *Lacinaria Halei*, from Dr. Hale's no. 334, from Louisiana (NY), stating: "This species has heretofore been included in *Lacinaria acidota*, with which it has little or nothing in common and it may be separated by its fewer leaves and much smaller heads which are disposed in elongated interrupted spikes". It would seem that by this time the erroneous synonymy of *L. mucronata* and *L. acidota* had led to such confusion that plants of the blacklands and prairies were referred to as *L. acidota* and Small made a second attempt to give the slender coastal plain plant its own rating as *Lacinaria Halei*. However the name *Liatris acidota* Engelm. & Gray can be taken up for it.

Bush (Amer. Mid. Nat. xii. 318 (1931)), in attempting to clarify *L. acidota*, made a comparison of a great many sheets of

so-called *L. acidota* and *L. punctata* and included in *L. acidota* only specimens from the coastal plain region of Texas and Western Louisiana. Among them he included one of Aug. 25–Sept. 10, 1898, collected by K. K. Mackenzie, no. 475, in low prairies at Lake Charles, Louisiana. I have seen duplicates of this specimen at the New York Botanical Garden and the Philadelphia Academy of Sciences and, finding them similar to the type plant, am agreeing with his interpretation.

L. acidota, as here interpreted, shows in common with the other species of the *Spicatae* series (except *L. microcephala*) the tall spicate form and non-pilose corolla, as well as a preference for moist habitats.

5. Liatris Garberi A. Gray. From clustered, elongate, thickened, tuberous roots that spread out in a somewhat fingeroid manner from the crown of the plant; stems one to several in older plants, hirsute and 3–5 dm. high: basal leaves linear, 1–2 dm. long, ca. 5 mm. wide, almost glabrous but with cilia along the margin of the lower half that narrows into a clasping petiole; upper ones reduced from the base of the spike as they are in *L. spicata:* heads 6–7-flowered, 8–15 mm. long, cylindrical and somewhat narrowed at the tip; phyllaries appressed, viscid-hirsute, ovate to lanceolate and acuminate- to mucronate-tipped, though not sharply, mostly entire but thin on the margins, sometimes ciliate; corolla tube 7–9 mm. long, smooth inside (i. e. lacking any pilosity), and phlox-purple; achene ca. 3 mm. long; pappus 6–7 mm. long, barbellate.—Proc. Amer. Acad. xv. 48 (1880). *Laciniaria Garberi* O. Ktze. Rev. Gen. i. 349 (1891); Small, Man. S. E. Fl. 1333 (1933). *Laciniaria Nashii* Small, Fl. S. E. U. S. 1175, 1338 (1903). *Laciniaria chlorolepis* Small, Man. S. E. Fl. 1333 (1933).

Low pinelands and damp flatwoods in the southern half of peninsular Florida.—FLORIDA. Without stated locality: 1842–49, *F. Rugel* (US). Co. undetermined: s. Florida, *A. P. Garber* (G, type). Orange Co.: St. John's River flats, Aug. 3, 1935, *L. H. Bailey & H. H. Hume* (F). Hillsborough Co.: Tampa, Sept. 1877, *A. P. Garber* ((NY, type of *Laciniaria chlorolepis* Small.), P (specimen to right), US); near Tampa, Nov. 19, 1928, *Mrs. C. A. Miles* (NY); Tampa, Aug. 25, 1903, *N. L. Britton & P. Wilson*, 35 (NY); low pinelands, s. of Riverview, Aug. 22, 1922, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 10605 (NY). Brevard Co.: low open meadow, Melbourne, Sept. 24, 1927, *O. F. Burger & E. West* (F). Indian River Co.: damp grassy prairie, halfway between Fellsmere and Sebastian, Aug. 13, 1925, *R. M. Harper*, 53 (G, NY). Manatee Co.: Palmetto, Aug. 21–

23, 1895, *G. V. Nash*, 2430 (G, NY, P, ND, F); Bradentown, July 5, 1900, *S. M. Tracy*, 7078 (G, NY, US); pinelands, near Salt Springs, Myakka Pen., Aug. 27, 1922, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 10612 (NY); flatwoods, Bradentown, Sept. 17, 1916, *A. Cuthbert* (F); flatwoods, Bradentown, Sept. 16, 1916, *A. Cuthbert* (F). Sarasota Co.: flatwoods, 10 miles south of Venice, Aug. 18, 1945, *L. O. Gaiser, Mrs. H. T. Butts & Miss L. Arnold* (F). Charlotte Co.: flatwoods ditch, s. of Punta Gorda, Aug. 18, 1945, *L. O. Gaiser, Mrs. H. T. Butts & Miss L. Arnold* (F). Palm Beach Co.: low flatwoods, 5 mis. w. of Lake Worth, Aug. 27, 1943, *E. West* (F). Hendry Co.: in low pineland, ½ mi. s. of La Belle, Aug. 14, 1929, *H. O'Neill* (US, F). Lee Co.: in pinelands, Fort Myers, Aug. 9, 1916, *J. Standley*, 313 (G (NY, type of *Laciniaria Nashii* Small), US); sand, *Ft. Myers*, Sept. 5, 1928, *G. F. Weber* (F); around ponds, Fort Myers, July–Aug. 1900, *A. S. Hitchcock*, 155 (G, NY, US). Collier Co.: Cat Tail Island, Big Cypress, Feb. 26, 1919, *P. P. Sheenan* (NY); pineland near Naples, Aug. 4, 1937, *Miss E. Scull* (F); flatwoods ditch, 9 mis. n. of Naples, Aug. 18, 1945, *L. O. Gaiser, Mrs. H. T. Butts, Miss L. Arnold* (F).

This is a singularly interesting species since it is the only one occurring anywhere east of the Mississippi that has elongate, thickened roots. While west of the Mississippi there are *L. punctata*, with a long ramifying rootstock, and *L. densispicata* Bush, which sometimes sends up aerial shoots as from the nodes of a rhizome, *L. Garberi* gives the only example of a clustered root that is rather fleshy and fingeroid. In the general appearance of its spike, in specific characters of pappus and corolla, as well as its habitat in damp soil, it is related to the *Spicatae* rather than the *Punctatae* series. It is however the only really hirsute member of the series. From members of the *Graminifoliae* series it is separated by the non-pilose corolla-tube. On examination of three sheets of Sept. 1877, *A. P. Garber*, Tampa, Florida (NY, US, P), named *Laciniaria chlorolepis* Small l. c., no sharp distinctions could be found to separate them from *L. Garberi*, while the fleshy root suggested close relationship to it.

Series II. Pycnostachyae. Glabrous to hirsute plants of numerous stiff spikes from large crowned perennial stocks; leaves linear, diminishing gradually upwards; paralleling west of the Mississippi the *Spicatae* series to the east; heads of approximately similar size and shape but with phyllaries acute to acuminate and recurved to merely loosely appressed; corolla-tube non-pilose within.

6. Liatris pycnostachya Michx. From an enlarged (though globose in young plants) woody rootstock often attaining 1 dm. in width: stems one to many, 6–15 dm. tall, stiff, striate, generally hirsute, sometimes glabrous: leaves numerous, linear, punctate, lower ones 1 dm. long, 4–5 mm. wide, hirsute or glabrous, gradually decreasing in length upwards and passing into bracts subtending the heads, which are 5–12-flowered, cylindrical, ca. 1 cm. long, sessile, crowded in very dense spikes 1.5–3 dm. long, 2–3 cm. in diameter, with a generally hirsute rachis; phyllaries herbaceous or purplish, lanceolate-acuminate or oblong with more or less acute tips, that are markedly squarrose, scarcely reflexed or merely lax and spreading; margin mostly ciliate when herbaceous but frequently merely crisped and sometimes petaloid; corolla phlox-purple, occasionally white, 7–9 mm. long, tube nonpilose or with very few hairs within; achenes 4–7 mm. long; pappus 6–7 mm. long, barbellate.—Michx. Fl. Bor. Amer. ii. 91 (1803); Torr. & Gray, Fl. N. Am. ii. 74 (1841), α and β; Gray, Synop. Fl. i^2. 110 (1884). *L. brachystachya* Nutt. Journ. Acad. Phil. vii. 72 (1834) and Trans. Amer. Phil. Soc. vii. 284 (1841). *L. Bebbiana* Rydb., Brittonia, i. 99 (1931). *Laciniaria Langloisii* Greene Pittonia, v. 58 (1902). *Liatris Langloisii* (Greene) Cory, Rhodora, xxxviii. 407 (1936). *Laciniaria macilenta* Small, Man. S. E. Fl. 1333 (1933). *Liatris pycnostachya* f. *Hubrichti* E. Anderson, Bull. Mo. Bot. Gard. xxv. 122 (1937) (albino form).

From the prairies of Indiana to South Dakota southward to Louisiana, Texas, and Oklahoma.—INDIANA. Jasper Co.: Without stated locality, Aug. 7, 1878, *T. M. Coulter* (G). Newton Co.: in prairie, along Penn Rwy., just w. of Goodland, Sept. 5, 1938, *C. C. Deam*, 59098 (O). Vigo Co.: in prairie habitat, along Vandalia Rwy., 4 mis. s. e. of Atherton, Sept. 23, 1917, *C. C. Deam*, 23994 (G). KENTUCKY. Co. undetermined: Barrens of Kentucky, 1835, *C. W. Short* (NY). WISCONSIN. Co. undetermined: Kalbs Farm, near East River, Aug. 5, 1878, *J. H. Schuette* (G, NY). Juneau Co.: Camp Douglas, July 16, 1890, *E. A. Mearns* (NY). Columbia Co.: Dells of Wisconsin, July 20, 1886, *C. H. Sylvester* (NY). Sauk Co.: Kilbourn, Aug. 26, 1909, *E. S. Steele*, 33 (G, NY). Milwaukee Co.: Bay View, July 31, 1880, *Dr. Hasse* (NY). Dane Co.: Lake Geneva, *Mrs. E. Bayer* (US); Madison, Aug. 30, 1893, *J. R. Churchill* (G). Rock Co.: Clinton, along the Chicago N. W. Rwy., Sept. 1, 1909, *E. S. Steele*, 109 (G). MINNESOTA. Pennington Co.: 24.5 mis. s. of Thief River Falls, July 18, 1934, *J. B. Moyle*, 1326 (NY). Hubbard Co.: Park Rapids, July 15, 1940, *H. A. Gleason*, 9443 (NY). Pope Co.: Glenwood, Aug. 1891, *B. C. Taylor*, 3641 (G, NY); Montevideo, Aug. 6, 1899, *L. Moyer* (NY); Montevideo, Aug. 9, 1906, *L. Moyer* (NY). Hennepin Co.: St. Anthony Park, Minneapolis, July 18, 1888,

J. H. Schuette (G, NY); Fort Snelling, Aug. 19, 1889, *E. A. Mearns* (G); wet prairie, Fort Snelling, July 31, 1888, *E. A. Mearns* (G); Fort Snelling, Aug. 28, 1881, *E. A. Mearns* (NY); Fort Snelling Reservation, Aug. 7, 1909, *C. O. Rosendahl*, 2344 (G). GOODHUE Co.: Zumbrota, Aug. 1892, *C. A. Ballard* (NY). MURRAY Co.: Lake Shetek, July 1922, *F. P. Metcalf*, 1897 (G, NY); without stated locality, July 1900, *J. M. Holzinger* (NY). ILLINOIS. Without stated locality: *S. B. Mead* (G, NY), *M. S. Bebb* (US). Co. undetermined: prairies, 1837, *C. W. Short* (G); prairies, 1849, *G. Vasey* (G). MCHENRY Co.: Ringwood, *G. Vasey*, 2 (G). WINNEBAGO Co.: Fountaindale, *M. S. Bebb* (G (NY type of *L. Bebbiana*) US). COOK Co.: moist prairie, e. border of Riverside, Aug. 24, 1909, *E. S. Steele*, 142 (G). KANE Co.: Aurora, Sept. 1884, *T. E. Boyce*, 1180 (G). ROCK ISLAND Co.: moist prairies, near Barstow, Aug. 1889, *F. E. McDonald* (G). KNOX Co.: damp prairie, Yates City, Aug. 1912, *F. E. McDonald* (G). MCLEAN Co.: prairie, Bloomington, Aug. 1886, *B. L. Robinson* (G). HANCOCK Co.: Augusta, 1842, *S. B. Mead* (G); *S. B. Mead*, Herb. H. A. Gleason, 1208 (G). CHAMPAIGN Co.: Champaign, July 23, 1898, *H. A. Gleason*, 292 (G); Big Four Rwy. toward Maryville, vicinity of Urbana, Aug. 11, 1910, *E. S. Steele* (US). CASS Co.: Beardstown, Aug. 1842, *C. A. Geyer* (G). ADAMS Co.: prairie, w. of Camp Point, July 18, 1941, *R. A. Evers, G. N. Jones & F. F. Jones*, 569 (G). CALHOUN Co.: prairie, Sept. 13, 1914, *R. Ridgway* 89 (G). MADISON Co.: wet prairies, Aug. 5, 1878, *H. Eggert* (G); Carbon, Aug. 5, 1878, *H. Eggert* (NY, US). RICHLAND Co.: near Olney, Sept. 6, 1914, *R. Ridgway* (G). WASHINGTON Co.: Irvington, Aug. 13, 1873, *G. H. French* (NY, US). IOWA. Without stated locality: *Chapman* (NY). EMMET Co.: Armstrong, Aug. 15, 1897, *R. I. Cratty* (G). DICKINSON Co.: low prairie s. w. of Miller's Bay, w. of Okoboyi Lake, Aug. 11, 1916, *B. Shimek* (G, US). FAYETTE Co.: Fayette, Aug. 1894, *B. Fink* (G). HARDIN Co.: vicinity of Iowa Falls, Aug. 1928, *M. E. Peck* (G). HAMILTON Co.: 2 mis. n. w. of Webster, Aug. 29, 1933, *Miss A. Hayden*, 412 (NY). MARSHALL Co.: La Moille to Marshalltown, Aug. 21, 1927, *C. C. Lounsbury* (O). STORY Co.: Ames, Aug. 8, 1896, *L. H. Pammel & C. R. Ball*, 40 (G, NY, US); Ames, Aug. 10, 1872, *J. C. Arthur* (NY); Ames, Aug. 4, 1907, *R. S. Jeffs* (O). JOHNSON Co.: Iowa City, Aug. 25, 1882, *B. Shimek* (US); Lake Macbride, July 1938, *J. L. Lofek* (NY). POWESHIEK Co.: Grinnell, *M. E. Jones* (NY). DALLAS Co.: without stated locality, Aug. 8, 1867, *J. A. Allen* (G). HARRISON Co.: Woodbine, 1875, *L. H. Horpradt*, 60 (US). DECATUR Co.: prairies, Aug. 24, 1897, *T. J. Fitzpatrick & M. F. L. Fitzpatrick*, 13548 (G). MISSOURI. Co. undetermined: Wolf Creek to Independence City, July 20, 1849, *A. Fendler* (G); Ozark region, St. Louis & San Francisco Rwy., July 25, 1896, *N. M. Glatfelter*

(US). Clark Co.: Medill, Aug. 24, 1910, *B. F. Bush*, 9169 (NY). Adair Co.: Kirksville, Aug. 6, 1887, *C. S. Sheldon* (NY). Rolls Co.: Hannibal, Sept. 8, 1916, *J. Davis*, 251 (G). Jackson Co.: prairies, Martin City, July 25, 1902, *K. K. Mackenzie*, 46 (NY); Buckner, Aug. 15, 1886, *B. F. Bush* (US). St. Louis Co.: St. Louis, *Drummond* (G); St. Louis, Aug. 1845, *G. Engelmann* (G); St. Louis, July 22, 1910, *E. E. Sherff* (G); wet prairie hillsides, Aug. 5, 1878, *H. Eggert* (US). Cass Co.: w. Belton, Aug. 4, 1902, *K. K. Mackenzie*, 96 (NY). Henry Co.: Clinton, July 31, 1911, *W. L. McAtee*, 3035 (G, US). Vernon Co.: near Horton, Aug. 1, 1919, *W. L. McAtee*, 3043 (US). Polk Co.: 5 mis. n. of Bolivar, Aug. 1, 1937, *J. A. Steyermark*, 24046 (NY). Webster Co.: without stated locality, Aug. 1883, *Miss Hosmer* (G). Jasper Co.: dry prairies, Webb City, July 26, 1908, *E. J. Palmer*, 1348 (US); high prairies, Sarcoxie, July 15, 1914, *E. J. Palmer*, 6262 (US); Sarcoxie, Aug. 14, 1897, *C. H. Demetrio*, 45 (NY); Carthage, Sept. 4, 1913, *F. W. Pennell*, 5369 (NY). Oregon Co.: 3 mis. n. of Kosh Konong, Aug. 9, 1934, *J. A. Steyermark*, 14383 (US). ARKANSAS. Without stated locality: *Leavenworth* (G), 1882, *F. L. Harvey* (US). Co. undetermined: northwest Ark., Aug. *F. L. Harvey* 12 (G). Benton Co.: 1899, *E. N. Plank* (NY). Washington Co.: without stated locality, 1895, *J. W. Blankinship*, 17 (G). Franklin Co.: moist meadow, Charleston, July 17, 1935, *F. J. Scully*, 372 (G). Prairie Co.: Hazen, July 25, 1937, *D. Demaree*, 15460 (O); waste areas in Grand Prairie, Hazen, June 29, 1941, *D. Demaree*, 22293 (G). Lonoke Co.: Carlisle, July 31, 1938, *D. Demaree*, 18010 (O). Garland Co.: open dry woods, Glenwood Rd., Hot Springs, July 1, 1938, *F. J. Scully*, 1072 (US). Arkansas Co.: Stuttgart, July 18, 1937, *D. Demaree*, 15424 (O). Clark Co.: low pine woods, Gurdon, Oct. 23, 1893, *C. Mohr* (NY, US). Howard Co.: Baker Springs, Oct. 2, 1909, *J. H. Kellogg* (US). LOUISIANA. Without stated locality: *Leavenworth* (NY), *Hale* (G, NY). Natchitoches Co.: dry sandy woods, Oct. 3, 1915, *E. J. Palmer*, 8813 (US). Rapides Co.: Alexandria, *Hale* (NY, US). Saint Tammany Co.: Covington, Sept. 30, 1911, *N. F. Peterson* (NY); Covington, April 5, 1912, *Bell & Peterson* (NY); 1 mi. n. of Abita Spring, Aug. 13, 1912, *F. W. Pennell*, 4140 (NY); 1 mi. n. of Abita Spring, Aug. 17, 1912, *F. W. Pennell*, 4252 (NY). Acadia Co.: wet prairies, Oct. 1, 1895, *A. B. Langlois* (ND, type of *L. Langloisii* Cory). Jefferson Davis Co.: low prairies, Welsh, Sept. 10, 1915, *E. J. Palmer*, 8483 (US). Calcasieu Co.: Lake Charles, Aug. 7, 1897, *S. M. Tracy*, 3447 (NY); moist pineland n. w. of West Lake, Sept. 23, 1913, *F. W. Pennell*, 5615 (NY). SOUTH DAKOTA. Roberts Co.: White Rock, 1903, *Mrs. H. D. Powell* (G). NEBRASKA. Cass Co.: low meadows & prairies, Weeping Water, *T. A. Williams* (US); Wabash, Aug.

1, 1889, *T. A. Williams*, 196 (US); Nehawka, *G. D. Swezey*, 189 (NY). Buffalo Co.: prairies, Aug. 1922, *W. E. B.*, 13071 (O). KANSAS. Riley Co.: Manhattan, Aug. 9, 1892, *J. B. Norton* (US, ND). Miami Co.: without stated locality, July 23, 1884, *J. H. Oyster* (NY). Cherokee Co.: without stated locality 1898, *L. V. Harvey* (US). Montgomery Co.: Caney, Aug. 31, 1895, *J. W. Blankinship* (G). OKLAHOMA. Co. undetermined: Choctaw Agency[1], July 19, 1853, *Whipple's Exped., J. M. Bigelow* (NY, US); Red River, *Dr. Pitcher* (NY). Ottawa Co.: in dry pasture, Ottawa, Aug. 29, 1913, *G. W. Stevens*, 2502 (G, NY). Osage Co.: in low places in prairies, Copan, Aug. 18, 1913, *G. W. Stevens*, 2143 (G, US, T, O). Tulsa Co.: near Dawson, July 8, 1928, *J. J. Meyer*, 112 (O); e. of Dawson, July 8, 1928, *Mr. Meyer* (O); s. of Tulsa, July 22, 1937, *P. V. Beck*, 169 (O); Tulsa, July 17, 1928, *Miss E. R. Force* (O). Noble Co.: near Perry, *Bayliff* (O). Cherokee Co.: wet prairies, Aug. 19, 1895, *J. W. Blankinship* (G, US). Creek Co.: Sapulpa, July 27, 1894, *B. F. Bush* 218 (G, US). Muskogee Co.: moist prairies, 3 mis. e. of Muskogee, July 18, 1926, *E. L. Little*, 190 (O); Lot 1, July 23, 1927, *E. L. Little*, 1992 (O); Lot 3, Aug. 28, 1927, *E. L. Little*, 2453 (O). LeFlore Co.: Page, Sept. 8, 1913, *G. W. Stevens*, 2691½ (G); Page, July 11, 1914, *O. W. Blakeley*, 1497 (G); Talihina, Aug. 4, 1933, *U. T. Waterfall* (NY). Latimer Co.: Laura, June 16, 1930, *O. M. Clark* (O). Pittsburgh Co.: McAlester, July 8, 1894, *C. S. Newhall*, 2 (G). Pontotoc Co.: near Stonewall, July 10, 1891, *C. S. Sheldon*, 126 (US). McCurtain Co.: open sandy ground, Idabel, July 22, 1915, *E. J. Palmer*, 8372 (US). Stephens Co.: 8 mis. s. of Dixie, July 26, 1905, *A. H. Van Fleet* (O). Choctaw Co.: dry open ground, Ft. Towson, July 16, 1915, *E. J. Palmer*, 8304 (US); [2]Ft. Towson, *Leavenworth* (G, NY). Bryan Co.: vic. of Durant, 1931, *W. L. Blain*, 222 (US). TEXAS. Without stated locality: 1843, *Lindheimer*, 74 (G); *C. Wright* (G). Morris Co.: Naples, June 27, 1935, *H. B. Parks & V. L. Cory*, 14426 (T). Smith Co.: Swan, June 10, 1902, *J. Reverchon*, 3305 (US). Houston Co.: sandy open bogs, Grapeland, Sept. 16, 1915, *E. J. Palmer*, 14406 (US); open sandy bog, Grapeland, Sept. 22, 1917, *E. J. Palmer* 12843 (US). Trinity Co.: 5 mis. s. w. of Trinity, Sept. 29, 1934, *V. L. Cory*, 10477 (G, T). Newton Co.: without stated locality, July 23, 1939, *B. C. Tharp* (G); 21 mis. n. of Deweyville, Oct. 4, 1934, *V. L. Cory*, 10963 (G). Tyler Co.: without

[1] In J. M. Bigelow—Report on Lieut. Whipple's Expedition, 1857, p. 96, Sec. 4, no mention is made of this species being collected. The maps and notes of country covered refer to Oklahoma.

[2] According to Barnhart, Journ. N. Y. Bot. Gard. xxii. 131 (July, 1921), Dr. Leavenworth, then a surgeon in the U. S. Army, was first stationed at Fort Towson (which is in Choctaw Co.), and it is probable that this collection was made in that vicinity.

stated locality, July 22, 1939, *B. C. Tharp* (G). WALKER Co.: on blackland prairie, Huntsville, July 9–12, 1909, *R. Dixon*, 402 (G, NY); without stated locality, 1920, *S. R. Warren*, 80 (US). HARDIN Co.: 2.6 mis. e. of Camp Jackson, Sept. 13, 1936, *V. L. Cory*, 19797 (G); (an albino) 2.6 mis. e. of Camp Jackson, Sept. 13, 1936, *V. L. Cory*, 19798 (G); without stated locality, *B. C. Tharp* (NY); Silsbee, Sept. 1926, *F. W. Pennell*, 5596 (NY). HARRIS Co.: Cypress, Aug. 1877, *S. Ball, ex Herb. Reverchon*, 752 (G); La Porte, Aug. 6, 1939, *H. R. Reed*, 314 (G); Bammel's Ranch, July 18, 1925, *H. Ness* (T); Pierce, July 19, 1901, *S. M. Tracy*, 7331 (NY). AUSTIN Co.: San Felipe, Aug. 1832, *T. Drummond*, 142 (G); ca. 7 mis. n. e. of Bellville, July 22, 1939, *B. C. Tharp* (G); Austin, Aug. 17, 1922, *B. C. Tharp*, 1393 (US). JEFFERSON Co.: Fannett, Aug. 28, 1932, *B. C. Tharp* (G). GALVESTON Co.: 13 mis. n. w. of Galveston, Aug. 4, 1939, *H. R. Reed*, 29 (G). FORT BEND Co.: Rosenburg to Wallis, July 11, 1929, *B. C. Tharp*, 7497 (G); Sugarland, Aug. 5, 1933, *O. Degener*, 5174 (NY). BRAZORIA Co.: Angleton, Sept. 14, 1933, *B. C. Tharp* (G). WHARTON Co.: between Ganado & Wharton, Sept. 19, 1921, *R. S. Ferris & C. D. Duncan*, 3253 (NY). MATAGORDA Co.: Palacios, July 2, 1939, *B. C. Tharp* (NY); without stated locality, July 2, 1939, *B. C. Tharp* (G). JACKSON Co.: near Edna, July 18, 1930, *S. E. Wolff*, 2421 (US); eastern part of county, July 22, 1939, *B. C. Tharp* (G).

André Michaux (Fl. Bor.-Amer. ii. 91 (1803)) described *L. pycnostachya* from "the Illinois meadows" together with *L. macrostachya* from Virginia and Carolina. Though there is no reference made to the collection of *Liatris* or *Serratula* in his journal (Proc. Amer. Phil. Soc. xxiv. no. 129, pp. 1–145 (1889)), he botanized along the Mississippi to the vicinity of Kaskaskia, a point 94 miles south of St. Louis. In the map of F. A. Michaux, (Travels to the westward of the Alleghany mountains, J. Mawman, 350 pp. (1805)), that region east of the Mississippi was called Illinois. The descriptions of the two species are very similar, the most distinctive difference being the nature of the phyllaries, squarrose at the tips in the former and appressed in the latter. A second difference is in pubescence, stem hirsute and leaves pubescent in *pycnostachya* and cilia basally on the shining leaves of *macrostachya*. Much of the puzzle in limiting this species has been bound up with the varying expressions of these two characters. Michaux's *L. macrostachya* seems none other than Linnaeus' *L. spicata*.

Nuttall (Jour. Acad. Phil. vii. 72 (1834)) described a new

species, *L. brachystachya*, for a very glabrous plant collected by Dr. Pitcher in Arkansas. He, however, made it synonymous with *L. pycnostachya* Michx. in a later publication (Trans. Amer. Phil. Soc. n. s. vii. 284 (1841)) and this procedure was also followed by Gray l. c. for the glabrous variety β, that had been adopted by Torr. & Gray l. c. from the description of Nuttall's species. Delimitation of hirsute and glabrous individuals as varieties seems useless because they occur without any special geographical range and various intermediates are so abundant.

Examination of a photograph of Michaux's type specimen (Paris), shows the phyllaries of the expanded heads as not markedly squarrose and neither sharply acute nor long-acuminate but rather oblong or lanceolate-acuminate and slightly reflexed ("apice reflexis" as given in Michaux's handwriting on the label of the specimen). The rachis and leaves clearly show a hairy condition.

Comparison of many specimens from the Mississippi basin shows a variation in phyllaries from long-acuminate, quite strongly recurved, to oblong with acute tips and less recurved, and to merely spreading. Also, although the stem is generally hirsute there is a range from plants with glabrous stems and almost glabrous recurved phyllaries without ciliate margins, through plants with hirsute stems and only scattered hairs along the midveins beneath and scant cilia on the margins of the outer phyllaries while the remainder have a crisped margin, to those with more generally hirsute leaves and phyllaries with ciliate margin to completely hirsute phyllaries.

Rydberg (Brittonia i. 99 (1931)) described *L. Bebbiana* from Illinois, stating it was "related to *L. pycnostachya* but the outer bracts are ovate and merely acute, not lanceolate and long acuminate". A detailed study of the type specimen (*M. S. Bebb*, Fountaindale, Winnebago Co., Ill., (NY)), has failed to disclose how this or any other fundamental character can separate it from *L. pycnostachya* Michx.

The most extreme cases of only slightly recurving non-acuminate phyllaries, combined with a glabrous condition, approach *L. spicata* (as *F. L. Harvey*, no. 12, from N. W. Arkansas (G), or of 1849, *G. Vasey* no. 2, Ringwood, McHenry Co., Ill. (G)). Or again, as referred to under *L. lancifolia* (see no. 2), in the more

western states, intergrades between the two of that region are suggested by ovate, ciliate-margined or but slightly crisped phyllaries. An occasional specimen with very broad leaves, as in *L. lancifolia*, but with the more *pycnostachya*-like inflorescence, as of July, 1891, *Hapeman*, from Platte Valley, at Fort Kearney, Neb. (US), gives further evidence of this mixture.

Greene (Pittonia v. 58 (1902)) described *L. Langloisii* from Louisiana, as allied to *L. pycnostachya* but well marked by its pale herbage and colorless involucral bracts, "wanting the purple tips of the kindred species". Examination of the type specimen (Oct. 1, 1895, *A. B. Lamglois*, from wet prairies, Acadia Co., Louisiana (ND)), showed that at the time of collection the spike had passed the blooming stage and was in seed, at which time (as noted in the introduction) the phyllaries of *Spicatae* and *Pycnostachyae*, if they have been colorful, usually become green. The strongly hirsute condition is marked, giving a glaucescent green color. But specimens from the more southern end of the range are frequently very hirsute without any correlation with lack of color of the phyllaries or smaller size of the achene. Thus the various combinations of herbaceous or purple-petaloid, glabrous or hirsute phyllaries, make it as difficult to draw sharp distinctions between *L. pycnostachya* and *L. Langloisii*, as acuminate or ovate, recurving or spreading phyllaries make it impossible to decide between *L. pycnostachya* and *L. Bebbiana*.

Specimens from Louisiana, as one showing markedly recurved phyllaries (Sept. 10, 1915, *E. J. Palmer*, no. 8483, from low prairies, Welsh, Jefferson Davis Co., (US)) and another showing them less so (Oct. 3, 1915, *E. J. Palmer*, no. 8813, dry sandy wood, Natchitoches (US)) give further support to the explanation offered for puzzling hirsute forms allied to *L. spicata* (see no. 1), as possible intermediates between these two species at the southern end of their ranges. The specimen of Aug. 20, 1903, *S. M. Tracy*, no. 8533, from Mendenhall, Simpson Co., Miss. (G, T) is still the only evidence I have seen of *pycnostachya*-like plants from Mississippi and since specimens from Louisiana, as that of A. B. Langlois and those of Bro. Arsène, show such varying degrees of hirsuteness combined with spreading of phyllaries, I prefer to treat them together as intermediates between *spicata* and *pycnostachya*.

As Gray (Synop. Fl. i². 111 (1884)) stated of *L. pycnostachya:* "Apparently this hybridizes with *L. spicata:* at least specimens occur which are intermediate between the two species." This is probably as true for the conditions on the frontiers of their occurrence (i. e. in Louisiana and Nebraska) as in the center of their overlapping ranges (specimen of Aug. 24, 1897, *T. J. & M. F. L. Fitzpatrick*, no. 13548, from prairies of Decatur Co., Iowa (G)). The number of intermediates is great and their variety so wide as to make impossible a type description of such hybrid populations. Since these two species are the most favored of the genus in perennial borders, many garden specimens showing different kinds of intermediacy are met with under a variety of horticultural names, not included here.

Records of single collections of each of two other interspecific hybrids follow.

× Liatris Ridgwayi Standl. (*L. pycnostachya* × *squarrosa*). Upper portion of plant only seen: stem slightly pilose; leaves linear, pubescent on under surface, gradually decreasing in length upwards; spike 19 cm. long and 3 cm. wide; heads ca. 18–flowered, sessile, somewhat crowded, subtended by foliar bracts, longer than or about equalling the length of the heads; outer phyllaries lanceolate-oblong, acuminate, almost entirely green or purple-tipped, pilose, with ciliate margins and somewhat squarrose apices; inner phyllaries oblong, appressed, acute or acuminate, almost glabrous, purple-tipped and recurved; corolla purple, 10 mm. long, inner surface of lobes hairy; achenes 3–5 mm. long; pappus 9 mm. long and short-plumose.—Rhodora, xxxi. 37 (1929).—ILLINOIS. Richland Co.: east of Bethel Church, Aug. 26, 1928, *R. Ridgway*, 3265 (Field Museum no. 579880, type, not seen; isotypes, G, US).

This rare plant was found growing with *L. pycnostachya* and *L. squarrosa* and, though it resembles the former more closely in general appearance, it is intermediate in other characters, as in number, distribution and size of heads and in the pappus. In the outer green phyllaries, the long foliose bracts subtending the heads and the hairy corolla lobes, it resembles *L. squarrosa.*

× Liatris **Frostii,** hybr. nov. (*L. aspera* × *pycnostachya*). Caulis unus 10.3 dm. altus superne pilis albis crispatis dense hirsutus denseque foliosus solum visus; foliis basalibus lanceolatis 1.5 cm. longis, 6 mm. latis sessilibus paginis ambobus hirsutis, medianis gradatim minoribus minusque hirsutis, superioribus

longitudine capitula aequantibus haud hirsutis; capitulis multis inter se distantibus 13-floris sessilibus leviter campanulatis ca. 13 mm. longis; phyllariis obtusis petaloideis marginibus purpurascentibus, exterioribus brevibus oblongis marginibus crispatis, interioribus apice leviter dilatatis plus petaloideis ca. 9 mm. longis; corollis 9 mm. longis intus pilosis; achaeniis 4 mm. longis, pappo 7 mm. longo vix plumoso nisi manifeste barbellato. —MINNESOTA: KANDIYOHI Co.: Spicer, Aug., 1892, *W. D. Frost* (G: TYPE).

This single specimen, like which no others have been seen and about the collection of which there is no exact information, strongly suggests another case of hybridization, and between two species for which there had previously been no such report. It resembles *L. pycnostachya*, a species occurring throughout that part of Minnesota, specimens of which from the adjoining county of Polk have been seen, in the more general appearance of the stem with many narrow leaves, and a fairly dense spike of numerous elongate heads. However, in the size of the heads and the obtuse tips and petaloid, crisped margins of all the phyllaries, it resembles *L. aspera*. From the township of Whitefield, lying about 8 miles south of Willmar and about 20 miles south and west of Spicer, two specimens have been seen of the same collector, W. D. Frost, no. 4893, collected in the same month, one of which, though not typical, is near *L. aspera* (US884659) and the other, *L. ligulistylis* (US201918), two species abounding and also hybridizing freely in that district (see no. 20). On examination of the corolla-tube of this particular specimen, × *L. Frostii*, it was found to be pilose within as in *L. aspera* thus pointing more toward that parentage than to *L. ligulistylis*.

SERIES III. GRAMINIFOLIAE. Plants with generally more open inflorescences than *Spicatae* and *Pycnostachyae*, varying from stiff-spicate to branched-paniculate and slender-racemose; leaves mostly ciliate along the petioles or with scattered hairs on mid-veins, if not entirely hirsute; heads 3–20-flowered, .7–1.5 cm. long, turbinate when flowers are open; phyllaries obtuse, with fine ciliolate margins mostly appressed when in bud but loosely spreading in mature heads; corolla-tube pilose within; achene 3–5 mm. long.

From the coastal plain of New Jersey to Florida and westward through and along the Appalachian ridge to the Gulf of Mexico.

a. All leaves linear to linear-lanceolate; phyllaries spreading in mature turbinate heads . . . . b.
b. Heads 5–15-flowered . . . . c.
c. Phyllaries without prominent mid-vein and with ciliolate margin; inflorescence varying from slender few-headed racemes to loose spikes or panicles . . . . d.
d. Pappus about as long as the corolla-tube . . . . . 7. *L. graminifolia.*
d. Pappus only half as long as the corolla; found only in the mountains of several adjacent counties in western N. Carolina . . . . . 8. *L. Helleri.*
c. Phyllaries with prominent midvein or keel and with entire margin; inflorescence generally loose, spicate to paniculate . . . . . 11. *L. regimontis.*
b. Heads 3–5-flowered; phyllaries without keel and quite ciliate; pedicels slender and often at right angles to the stem; heads short-turbinate when flowers are open . . . . 10. *L. gracilis.*
a. Lower leaves more broadly lanceolate, upper ones linear-lanceolate; heads 10–20-flowered; inflorescence more stiffly spicate; phyllaries without keel, obtuse, oblong to orbicular and appressed when in bud, with narrowly scarious or ciliolate margin . . . . . 9. *L. turgida.*

7. Liatris graminifolia (Walt.) Willd. Corm globose, up to 3 cm. in diameter; stems single or few, sometimes striate, 3–7 dm. high, glabrous or with long scattered hairs or hirsute; basal leaves 10–15 cm. long, narrowly linear (2 mm. wide) or linear-lanceolate (5–10 mm. wide), with ciliate margins or with long hairs along the winged petioles and sometimes scattered over the lower surface; upper leaves reduced in length and width: inflorescence either a long slender spike, or a fairly dense raceme that frequently becomes paniculate, or an open short raceme of a few scattered heads: heads sessile or pedicellate, of 5–15 flowers, 10–15 mm. high, 6–12 mm. wide and somewhat turbinate in shape at the time of flowering; phyllaries thin, glabrous or hirsute, loose, not overlapping much laterally, narrowly linear to ovate-lanceolate, 1–4 mm. wide, obtuse, scarious and very finely ciliolate on the margin; corolla 6–8 mm. long, purple; pappus 5–6 mm. long, barbellate; achene 3–4 mm. long.—Sp. Pl. iii. 1636 (1803). *Anonymos graminifolia* Walt. Fl. Car. 197 (1788).

From New Jersey and southern Pennsylvania southward to Florida and Alabama.

Key to varieties

a. Inflorescence somewhat spicate, though often paniculate, and of quite numerous heads; phyllaries narrowly linear, 1–3 mm. wide . . . . b.
b. Leaves narrowly linear; stem and leaves with scattered hairs; heads small, with narrowly linear phyllaries ca. 1 mm. wide; from the coastal plain region of Virginia and the Carolinas . . . . . var. *typica.*
b. Basal leaves broader, linear-lanceolate; stem and leaves mostly glabrous, but with long hairs along the winged petioles; heads larger; of more general distribution in the northeastern range of the species . . . . . var. *dubia.*

b. Stem and pedicels densely hirsute; leaves linear-lanceolate; of northern range . . . . . var. *lasia*.

a. Inflorescence slender, somewhat virgate, with few scattered heads; phyllaries a little broader, 3–4 mm. wide and frequently rounded at the tip . . . . c.

c. Shorter plants of few leaves, the basal linear-lanceolate, much longer than the others; from mountains in Virginia, North and South Carolina . . . . . var. *Smallii*.

c. Taller plants with more numerous linear leaves; from Georgia, Alabama and Florida . . . . . var. *elegantula*.

Var. **typica.** Stems tall, slender, with long scattered hairs: leaves numerous, generally with abundant long hairs; basal ones narrowly linear, 10–12 cm. long and 2–4 mm. wide, with ciliate margins; upper ones reduced in length, and in width to 1 mm.: inflorescence usually a long, slender, dense spike of 2 cm. width when flowers are open, sometimes becoming paniculate: heads 5–9-flowered, mostly sessile and erect, ca. 1 cm. high, 5–6 mm. wide when flowers are open; phyllaries narrowly linear, ca. 1 mm. wide; corolla-tube 6–7 mm. long; pappus 4–5 mm. long; achene ca. 3 mm. long.—*Anonymos graminifolia* Walt. Fl. Car. 197 (1788). LIATRIS GRAMINIFOLIA Willd. Spec. Pl. iii. 1636 (1803); Ell. Sk. ii. 274 (1824).

New Jersey to Alabama, chiefly on the coastal plain.—NEW JERSEY. OCEAN Co.: in sandy field, Forked River, Aug. 31, 1937, *H. N. Moldenke*, 10172 (NY). BURLINGTON Co.: Atsion, Aug. 1877, *T. C. Martindale* (US). CAMDEN Co.: Atco, Sept. 15, 1904, *T. W. Edmondson*, 1201 (G). ATLANTIC Co.: Weymouth, Sept. 12, 1923, *E. P. Killip*, 12395 (US). CAPE MAY Co.: on sand dunes, Five Mile Beach, Oct. 2, 1889, *A. MacElwee* 1413 (NY); in sandy Rwy. bed, Wildwood, Aug. 6, 1928, *A. Moldenke*, 4084 (NY); without stated locality, Sept. 20, 1894, *C. Mohr* (US). MARYLAND. HARFORD Co.: without stated locality, Aug. 10, 1873, *J. W. Eckfeldt* (P); along Bush R., n. of Bush R. Sta., Sept. 10, 1902, *G. H. Shull* (G). BALTIMORE Co.: near Baltimore, 1873, *D. Foreman* (US); Oakwood, near Baltimore, Sept. 6, 1896, *A. Fredholm*, 2224 (NY, US). ANNE ARUNDEL Co.: dry soil, right of road, from Muirkirk to Contee, Sept. 5, 1910, *A. H. Moore*, 4832 (G). PRINCE GEORGES Co.: low pasture land, vicinity of Lanham, June 28, 1910, *W. R. Maxon*, 4605 (US); dry field, Carter's Lane, Sept. 29, 1914, *E. S. Steele* (US). DELAWARE. SUSSEX Co.: s. of Robbins, Sept. 5, 1925, *F. W. Pennell*, 12865 (P); moist swale, ¼ mi. e. of Ellendale, Sept. 23, 1938, *R. R. Tatnall*, 4053 (G). DISTRICT OF COLUMBIA AND VICINITY. Terra Cotta Swamp, Aug. 1895, *D. L. Topping* (US); vicinity of Washington, Oct. 1, 1876, *L. F. Ward* (US). VIRGINIA. ARLINGTON Co.: 1 mi. e. of Rwy., Barcroft Station, Oct. 3, 1915, *E. S. Steele* (US); edge of sandy oak woods, on Washington Blvd., at Glebe Road, Sept. 28, 1940, *F. J.*

Hermann (NY); Rwy., Cowdons, Sept. 22, 1912, *E. S. Steele*, 643156 (US). James City Co.: on dry sandy red soil by roadside, 2 mis. w. of Williamsburg, Sept. 27, 1921, *E. J. Grimes*, 4625 (NY); dry barren soil, 2 mis. s. of Williamsburg, Sept. 23, 1921, *E. J. Grimes*, 4427 (NY); along C. & O. Rwy. 1 mi. w. of Lightfoot, Sept. 26, 1921, *E. J. Grimes*, 4496 (NY); dry sandy soil, along C. & O. Rwy. e. of Lightfoot, July 23, 1921, *E. J. Grimes* 4096 (NY). Prince George Co.: 1–3 mis. w. of New Bohemia, Sept. 24, 1927, *E. T. Wherry & F. W. Pennell*, 14415 (P). Chesterfield Co.: dryish swale, n. w. of Colonial Heights, Sept. 16, 1938, *M. L. Fernald & B. Long*, 9452 (G). Sussex Co.: moist pinelands, just s. e. of Waverly, Sept. 10, 1937, *M. L. Fernald & B. Long*, 7661 (G, US); damp sandy pine & oak woods, s. of Stony Creek, Sept. 21, 1939, *M. L. Fernald & B. Long* 11455 (G). Dinwiddie Co.: ca. 1 mi. n. e. of Burgess, Sept. 13, 1937, *M. L. Fernald & B. Long* 7662 (G); dry pine woods, n. w. of Carson, Sept. 14, 1937, *M. L. Fernald & B. Long* 7663 (G). Princess Anne Co.: along trailsides in pine-oak-hickory forest, Cape Henry, Sept. 3, 1940, *F. E. Egler*, 40–348 (NY); dry oak woods, The Desert, Cape Henry, Sept. 23, 1933, *M. L. Fernald & L. Griscom*, 2907 (G). Nansemond Co.: dry sandy woods & adjacent clearings, Kilby, Sept. 11, 1935, *M. L. Fernald & B. Long* 5078 (G); Suffolk, Sept. 17, 1907, *E. B. Bartram & B. Long*, (US); Kilby, Sept. 11, 1935, *M. L. Fernald, B. Long & J. M. Fogg*, 5145 (G). Southampton Co.: clearing in pine & oak woods, w. of Branchville, Sept. 20, 1938, *M. L. Fernald & B. Long*, 9454 (G). Greensville Co.: mossy pineland e. of Slagle's Pond, n. of Emporia, Sept. 20, 1938, *M. L. Fernald & B. Long*, 9457 (G). NORTH CAROLINA. Without stated locality: *M. A. Curtis* (G). Co. undetermined: eastern North Carolina, Sept. 6, 1908, *W. W. Eggleston*, 4052 (G, NY). Nash Co.: pineland, at Middlesex, Oct. 9, 1938, *R. K. Godfrey & T. Kerr*, 6627 (G); sandy soil, Rocky Mt., Oct. 17, 1912, *F. W. Pennell* (P). Durham Co.: Duke Forest, Sept. 16, 1932, *H. L. Blomquist*, 28 (US); low open dry ground, Old Oxford Rd., Sept. 24, 1938, *H. L. Blomquist*, 10519 (F). Forsyth Co.: Bronton suburbs, Winston Salem, Oct. 30, 1921, *P. O. Schallert* (G). Martin Co.: swale at Williamston, Oct. 13, 1938, *R. K. Godfrey*, 7024 (G). Wake Co.: 4 mis. n. of Raleigh, Oct. 10, 1938, *R. K. Godfrey*, 6688 (G). Chatham Co.: pine woodland, at Siler City, Oct. 12, 1938, *R. K. Godfrey* 6977 (G); along Pittsboro Road, near town, Sept. 29, 1909, *W. C. Coker* (NY). Harnett Co.: pineland near Lilington, Aug. 5, 1938, *R. K. Godfrey* 5673 (G). Lee Co.: open pine woodland, at Sanford, Oct. 12, 1938, *R. K. Godfrey*, 6929 (G). Pamlico Co.: pinelands at Grantsboro, Oct. 11, 1938, *R. K. Godfrey & R. N. White*, 6825 (G). Craven Co.: Newbern, Oct. 10, 1898, *T. H. Kearney*, 2231 (US). Onslow Co.: in dry sandy land, 10

mis. s. of Jacksonville, Nov. 4, 1929, *H. N. Moldenke*, 116a (NY). NEW HANOVER Co.: sandy pineland, Wilmington, Oct. 15, 1912, *F. W. Pennell*, 4907 (US, P); Wilmington, Sept. 20, 1888, *G. McCarthy* (US); vicinity of Wilmington, Nov. 1922, *Mrs. M. H. Cummings* (US). SOUTH CAROLINA. Co. undetermined: dry pineland, Santee Canal, Oct., *H. W. Ravenel* (G). JASPER Co.: Ridgeland, Nov. 13, 1893, *C. Mohr* (US). BEAUFORT Co.: without stated locality, 1882, *Dr. Mellichamp* (US). GEORGIA. Co. undetermined: dry rocky hillside, Oct. 8, 1893, *C. Mohr* (US). ALABAMA. MOBILE Co.: Spring Hill, Sept. 28, 1878, *C. Mohr* (US).

Var. DUBIA (Barton) Gray. Generally the most robust-looking of all the varieties: stem striate and glabrous with scattered hairs: basal leaves linear-lanceolate, 6–10 cm. long, 5–7 mm. wide, with hairs along the winged petioles and sometimes scattered over the lower surface; upper ones reduced in length: heads erect, usually sessile or on short pedicels in a fairly dense raceme, but frequently becoming paniculate, 10–15-flowered and thus larger than in other varieties, 12–15 mm. high and 10–12 mm. thick at the time of flowering; phyllaries linear, ca. 2 mm. wide, obtuse and ciliolate on the margin; corolla purple (rarely white), 6–8 mm. long; pappus ca. 5 mm.; achene 4 mm. long.—*Liatris graminifolia* var. *dubia* Gray, Man. ed. 1. 191 (1848), ed. 2, 185 (1856). *Liatris dubia* Barton, Mat. Med. ii. 223, t. 49 (1818); Gray, Synop. Fl. i^2. 111 (1884), in part. *Serratula spicata* L. Sp. Pl. ii. 819 (1753), as to citations Gron. Virg. 92 (1739), Dill. Elth. 85 t. 72 (1732). *Serratula pilosa* Ait. Hort. Kew ed. 1, iii. 138 (1785). *Liatris pilosa* Willd. Spec. Pl. iii. 1636 (1803); Pursh, Fl. Am. Sept. ii. 508 (1814); Ell. Sketch ii. 277 (1824); Ker-Gawl. Edwards Bot. Reg. t. 595 (1821). *Liatris spicata* γ *racemosa* DC. Prodr. v. 131 (1836). *Liatris propinqua* Hook. Bot. Mag. lxvii. t. 3829 (1841). *Liatris virgata* Nutt. Jour. Acad. Phil. vii. 72 (1834), and Trans. Amer. Phil. Soc. n. s. vii. 284 (1841).

New Jersey and Pennsylvania southward through North Carolina.—NEW JERSEY. Without stated locality: *A. Gray* (G); *P. D. Knieskern* (G). Co. undetermined: pine barrens, Sept. 1872, *Ex. Herb. Miss M. Treat* (G); pine barrens, Sept. 1869, *T. C. Porter* (US). OCEAN Co.: Tom's River, *W. W. Denslow* (NY); Quaker Bridge, Tom's River, 1860, *D. C. Eaton* (G, NY); pine barrens, 1 mi. w. of Tom's River, Sept. 12, 1930, *J. A. Drushel*, 8515 (US); sandy open depression, East Plains, Sept. 7, 1924, *F. W. Pennell*, 12918 (NY); dry pine barrens, Barnegat Pier, Sept. 1907, *K. K. Mackenzie*, 2919 (US); low pine barrens, Forked River, Sept. 18, 1893, *L. H. Lighthipe* (NY, US); Manchester, Aug. 28, 1879, *N. L. Britton*, 16 (G); Manchester, Aug. 31, 1878, *G. Guttenberg* (US); Manchester, Sept. 15, 1879,

A. Brown (NY); Manchester, Sept. 17, 1870, *Mus. Nat. Hist.* (NY). Burlington Co.: without stated locality, *C. F. Parker* (G); Chatsworth, Sept. 5, 1897, *E. H. Eames* (G); Woodmansie, Sept. 25, 1879, *C. L. Pollard* (US); in dry sandy soil, Sept. 3, 1867, *C. F. Parker* (G); wet sand, Atsion, Sept. 5, 1917, *A. Gershoy*, 685 (G); Atsion, Aug. 22, 1879, *O. D. Allen* (G); Brown's Mills, Sept. 11, 1864, *E. Dillenbaugh* (G); Atlantic Co.: Egg Harbor, Sept. 6, 1884, *E. G. Knight* (NY); Egg Harbor, Sept. 6, 1884, *W. H. Manning* (G); Egg Harbor, Sept. 6, 1884, *L. F. Ward* (US); sandy soil, Egg Harbor, Sept. 4, 1938, *R. L. Schaeffer*, 827 (G); Hammonton, Sept. 6, 1913, *W. M. Benner* (G); in sand, Hammonton, Sept. 4, 1917, *A. Gershoy*, 684 (G); dry pine barrens, Hammonton, Aug. 24, 1907, *Shreve & Miller* (US). Cumberland Co.: Vineland (albiflora), 1872, *Miss M. Treat* (G); sandy pineland 3 mis. s. e. of Millville, Sept. 11, 1924, *J. R. Pennell* (NY). Cape May Co.: dry sandy meadow, Briar Island, Sept. 25, 1915, *B. Long*, 13592 (G); Anglesea, Sept. 20, 1891, *C. D. Lippincott* (G). PENNSYLVANIA. Bucks Co.: Quaker Bridge, 1882, *C. D. Fretz* (Q). DELAWARE. Sussex Co.: sandy woods, Rehoboth, Sept. 12, 1908, *J. R. Churchill* (G); edge of salt marsh, Fenwick Is., Sept. 16, 1934, *R. R. Tatnall*, 2385 (G); Indian River Bay, Sept. 12, 1934, *A. S. Goodale*, 77591 (G). MARYLAND. Harford Co.: on dry bank along Bush R., n. of Bush R. Station, Sept. 10, 1902, *G. H. Shull*, 348 (NY, US); Savage Station, Sept. 4, 1905, *H. D. House*, 1527 (US). Baltimore Co.: Baltimore, 1866, *P. V. LeRoy* (NY); without stated locality: Sept. 1888, *G. L. S. Herb.*, 1179 (G); Springfield Road, Baltimore, 1888, *J. H. Holmes* (US); sandy clearing, shore of Bird R., 2 mis. e. of Whitemarsh, Sept. 16, 1938, *F. J. Hermann* (NY). Montgomery Co.: Woodside, Sept. 20, 1896, *H. Wolds* (US). Calvert Co.: on Miocene escarpment, at Little Cove Point, Oct. 15, 1937, *H. A. Allard*, 3827 (G, US). Prince Georges Co.: n. of Riverdale, Sept. 23, 1916, *E. S. Steele* (US); dry woods, near Hyattsville, Oct. 13, 1919, *F. W. Hunnewell* 6498 (G); sandy soil, Ardwick, Sept. 5, 1910, *F. W. Pennell*, 2647 (NY); dry gravelly field, near Bladensburg, Oct. 3, 1926, *S. F. Blake*, 9734 (G); Bladensburg, 1883, *McCarthy* (US); dryish open knoll, vic. of Lanham, Sept. 24, 1910, *W. R. Maxon & P. C. Standley*, 6 (US); Silver Hill, Sept. 6, 1915, *W. L. McAtee*, 2346 (US); in sphagnum bog, between Magruder & Benning, Sept. 6, 1899, *E. L. Morris*, 309 (US). DISTRICT OF COLUMBIA AND VICINITY. Vicinity of Washington, *L. F. Ward* (NY, US); vicinity of Washington, Sept. 17, 1880, *L. F. Ward* (G); Sluice Run, vicinity of Washington, Sept. 14, 1879, *L. F. Ward* (US); Washington, 1876, *Vasey* (US); Bates Road, vicinity of Washington, Sept. 28, 1888, *E. S. Burgess* (US); Terra Cotta, vicinity of Washington, Sept. 30, 1896, *E. S. Steele* (US); vicinity

of Washington, Sept. 12, 1922, *E. S. Steele* (US); District of Columbia, Sept. 13, 1874, *L. F. Ward*, 736 (US); dry open woods, Brookland, Oct. 2, 1927, *H. O'Neill* (NY); Takoma Park, Oct. 6, 1897, *T. A. Williams* (G); sandy woods, Takoma Park, Sept. 8, 1904, *H. D. House* (US); Takoma Park, Sept. 6, 1905, *H. D. House*, 1533 (US); sandy woods, near Takoma Park, Aug. 25, 1904, *H. D. House*, 335 (NY); sandy woods, Takoma Park, Sept. 8, 1904, *J. H. Painter*, 1149 (US); Chesapeake Beach Junct., Oct. 5, 1911, *A. Ruth*, 45 (G). VIRGINIA. ARLINGTON Co.: Fort Barnard, near Cowdons, Oct. 1, 1916, *E. S. Steele* (G, NY, US); Cowdons, near Southern Rwy., Sept. 22, 1912, *E. S. Steele* (US). FAIRFAX Co.: Fort Myer, Oct. 24, 1895, *E. A. Mearns* (NY); Falls Church, Sept. 26, 1874, *J. J. Carter* (P); Mount Vernon, Sept. 27, 1902, *F. L. Fisher* (P). NORTHAMPTON Co.: Cape Charles City, Sept. 25, 1894, *W. M. Canby*, 823 (US); NORTHUMBERLAND Co.: dry woods, Coan, Oct. 17, 1916, *I. Tidestrom*, 8185 (G). ROCKBRIDGE Co.: Balcony Falls, Sept. 5, 1883, *Dr. & Mrs. N. L. Britton* (NY). JAMES CITY Co.: field, ca. 5 mis. w. of Toano, Oct. 1, 1939, *R. W. Menzel* (G); opening in flat pine woods, Williamsburg, Sept. 25, 1920, *E. J. Grimes*, 3107 (G). CHESTERFIELD Co.: field, May, 1935, *E. Veazey* (G); dry field, near St. Elmo, Sept. 17, 1910, *P. C. Standley*, 5903 (US). CAMPBELL Co.: dry sunny hillside, at mouth of Otter R., near Altavista, Oct. 6, 1913, *J. Fauntleroy*, 610 (US); Lynchburg, Sept. 17, 1927, *W. A. Murrill* (F). WYTHE Co.: Walker Mt., Sept. 1, 1931, *E. L. Core*, 3372 (NY). SMYTH Co.: road between Marion & White Top Mt., Aug. 22, 1908, *P. A. Rydberg* (NY). SUSSEX Co.: open pine & oak woods, near Greensville line, s. of Jarratt, Sept. 18, 1938, *M. L. Fernald & B. Long*, 9453 (G). PRINCESS ANNE Co.: dry sandy barrens, Cape Henry, Sept. 23, 1933, *M. L. Fernald & L. Griscom*, 2908 (G); Cape Henry, Sept. 23, 1933, *M. L. Fernald & B. Long*, 2909 (G). HALIFAX Co.: 2 mis. n. e. of Clover, Sept. 23, 1927, *E. T. Wherry & F. W. Pennell*, 14391 (P). GREENSVILLE Co.: open thickets, clearings & woods, s. of Emporia, Sept. 20, 1938, *M. L. Fernald & B. Long*, 9455 (G). NORTH CAROLINA. AVERY Co.: slopes of Grandfather Mt., Sept. 25, 1898, *W. M. Canby & C. S. Sargent & J. Muir*, 71 (US). BURKE Co.: without stated locality, 1836, *Curtis* (NY). MCDOWELL Co.: vic. of Graphiteville, Aug. 29, 1913, *P. C. Standley & H. C. Bollman*, 10086 (US). BUNCOMBE Co.: open hillside, vic. of Montreat, Aug. 29, 1913, *P. C. Standley & H. C. Bollman*, 10079 (US); bushy hillside, vic. of Montreat, Sept. 9, 1913, *P. C. Standley & H. C. Bollman* 10497 (US); open woods, vic. of Montreat, Sept. 9, 1913, *P. C. Standley & H. C. Bollman*, 10527 (US). POLK Co.: Columbus, Aug. 10, 1897, *E. C. Townsend* (US). CRAVEN Co.: Newbern, Oct. 10, 1898, *T. H. Kearney*, 22207 (US). SOUTH CAROLINA.

Georgetown Co.: sandy pine woods, Oct. 12, 1934, *F. G. Tarbox* 175-1 (NY). GEORGIA. Without stated locality: *Nuttall* (P, isotype of *Liatris virgata* Nutt.).

Var. lasia Fern. & Griscom. A hirsute variety resembling var. *dubia* generally in arrangement and size of leaves, heads and flowers but with pubescent stem and leaves; the phyllaries too are similar, though the margins are distinctly ciliate.—Rhodora, xxxvii. 183 (1935). *Liatris pilosa* Lodd. Bot. Cab. t. 356 (1819).

New Jersey, Delaware and Alabama.—NEW JERSEY. Co. undetermined: pine barrens, Sept. 1870, *A. H. Smith* (G). Camden Co.: Lindenwold, Sept. 29, 1903, *J. M. Fogg*, 622 (G, type); south of R. P. R. Station, Lindenwold, Sept. 18, 1920, *H. B. Meredith* (G). Cumberland Co.: ⅓ mi. s. of Seeley's Mill, Bridgeton, Sept. 1, 1924, *Beals & Bassett* (G); 3 mis. s. e. of Millville (1 plant), Sept. 11, 1924, *J. R. Pennell* (NY). DELAWARE. Kent Co.: dry soil, Felton, Sept. 28, 1863, *A. Commons* (P). Sussex Co.: Rehoboth, Sept. 1908, *C. S. Williamson* (P). ALABAMA. Mobile Co.: pine barrens, Spring Hill, Aug. 1919, *E. W. Graves*, 731 (US).

Var. Smallii (Britt.) Fern. & Griscom. Generally a shorter, more slender variety often with reddish non-striate stems of 3–5 dm. and with fewer leaves: basal leaves quite long, linear-lanceolate (10–15 cm.) and 3–10 mm. wide, reduced upwards to bracts usually shorter than the heads: inflorescence an open, short raceme of few scattered heads, averaging approximately one head per centimeter; rachis slender; heads generally sessile, 8–12-flowered, 8–12 mm. high.—Rhodora xxxvii. 182 (1935). *Laciniaria Smallii* Britton, Man. 927 (1901).

Southwestern Virginia to Georgia, chiefly in the mountains.—VIRGINIA. Augusta Co.: Mt. Rogers, Elliot's Knob, Aug. 9, 1893, *A. A. Heller & E. G. Halbach* 1179 (G, NY, P). Bath Co.: on more fertile slope, exposed shale barrens, along railroad cut just w. of tunnel, Millboro, Sept. 11, 1935, *J. W. Adams & E. T. Wherry* 2409 (G). Bedford Co.: without stated locality, Sept. 1, 1871, *A. H. Curtiss* (G (right plant), NY); Aug., *A. H. Curtiss*, (G); Aug. 30, 1872, *A. H. Curtiss* (ND). Roanoke Co.: dry woods on Chestnut Ridge, just s. of South Roanoke, Aug. 25, 1942, *C. E. Wood*, 5298 (G). Montgomery Co.: Blacksburg, July 30, 1895, *W. H. Murrill* (NY). Giles Co.: border of dry woods, Salt Pond Mt. (alt. 3800′), Aug. 4, 1937, *J. M. Fogg*, 12942 (G); Salt Pond Mt., Aug. 1890, *W. M. Canby* (G). Wythe Co.: Walker Mt., Sept. 5, 1899, *ex Biltmore Herb.*, 4117h (NY); Wytheville, Lick Mt., Oct. 6, 1867, *H. Shriver* (G). Smyth Co.: Iron Mt., along Dickey Creek, Aug. 8, 1892, *J. K. Small* (G (NY, type)); slopes & summits of Iron Mt., at Skull Gap, Aug. 11–12, 1892, *J. K. Small* (US). WEST VIRGINIA. Greenbrier Co.: Kate's Mt., Aug. 9, 1941, *F. W. Hunnewell*, 17466

(G). Monroe Co.: Cove Creek, Sweet Springs, July 22, 1929, *W. V. U. Biol. Exped.* (G). NORTH CAROLINA. Yancey Co.: woods, Mt. Mitchell, Sept. 14, 1926, *F. W. Hunnewell*, 16028 (G). Henderson Co.: Hendersonville, Sept. 18, 1898, *Biltmore Herb.*, 4117d (NY); Flat Rock, Aug. 24, 1881, *J. D. Smith* (G). SOUTH CAROLINA. Chester Co.: Chester State Park, Aug. 12, 1935, *R. B. Mackintosh* (G). GEORGIA. Wilkes Co.: without stated locality, *Herb. J. A. Lowell* (G).

Var. elegantula (Greene) K. Sch. Stems slender, almost glabrous, 5–7 dm. high: leaves mostly linear; basal ones 10–25 cm. long, 3–4 mm. wide, glabrous, with broad ciliolate petioles, sometimes with woolly tufts on the petioles or scattered hairs on the under side: inflorescence a lax racemiform spike of sessile or slenderly pedicellate heads; rachis slender and somewhat virgate to stiffer and straight: heads more horizontal and campanulate in shape, of 8–12 flowers; phyllaries ovate to oblong with rounded less scarious tips; corolla-tube 6–7 mm. long; pappus 5–6 mm. long; mature achene 3 mm. long. —Just, Bot. Jahresb. xxix[1]. 569 (1903). *Laciniaria elegantula* Greene, Pittonia iv. 316 (1901).—Georgia and Florida to Mississippi.—GEORGIA. Without stated locality: *Boykin* (G, NY, P). Liberty Co.: near Sunbury, *J. LeConte* (NY). Habersham Co.: Tallulah Falls, 1846, *T. C. Porter* (P); dry hillsides, Tallulah Falls, Aug. 1899, *A. Cuthbert* (F); between Toccoa Falls & Tallulah Falls (alt. 1000′–1700′), Sept. 3, 1894, *J. K. Small* (NY). Floyd Co.: Rome, *Herb. Chapman* (US). Clarke Co.: dry oak woods, Athens, July 3, 1900, *R. M. Harper* 132 (G). Gwinnett Co.: on Yellow River, near McGuire's Mill (alt. 750′), Sept. 9, 1894, *J. K. Small* (NY). Richmond Co.: damp pineland, Augusta, Sept. 16, 1903, *A. Cuthbert*, 1004, 1004a (F); flat pineland, Augusta, Sept. 16, 1904, *A. Cuthbert*, 1004 (US); dry flat barrens, Augusta, Sept. 20, 1903, *A. Cuthbert*, 1004 (F). Ware Co.: Waycross, Sept. 17, 1909, *W. W. Eggleston*, 5099 (NY). Mitchell Co.: Camilla, Sept. 20, 1909, *W. W. Eggleston*, 5129 (G, NY, P, US). Lowndes Co.: dry woods, ca. 2½ mis. e. of Valdosta, Sept. 8, 1902, *R. M. Harper*, 1614 (G, US). FLORIDA. Without stated locality: *Chapman* (G, NY, US), *Leavenworth* (G, NY). Leon Co.: near Tallahassee, *N. K. Berg* (NY); Tallahassee, Oct. 10, 1914, *R. M. Harper*, 225 (G, NY, US). Liberty Co.: Aspalaga (Rwy. Sta. of Rock Bluff), Oct. 1892, *Biltmore Herb.*, 4117b (G, US). ALABAMA. Talladega Co.: open rocky woods, Chandler Springs, Talladega Mts., Sept. 20, 1892, *C. Mohr* (US); dry rocky hillsides, Oct. 1893, *C. Mohr* (US); rocky dry ridges, Chandler Springs, Sept. 1892, *C. Mohr*, 1a (NY); rocky dry ridges, Mts., Oct. 14, 1893, *C. Mohr*, 1b (NY); on Talladega Mts., Sept. 1843, *Rugel* (NY). Jefferson Co.: East Lake, Birmingham, Oct. 9, 1896, *C. Schuchert* (NY, US). Tuscaloosa Co.: e. of Tuscaloosa, Sept.

23, 1933, *R. M. Harper*, 3121 (G, US); mixed woods, edge of pine barrens, 10 mis. n. e. of Tuscaloosa, Oct. 4, 1912, *H. H. Bartlett*, 3337 (US). LEE Co.: Auburn, Oct. 18, 1896, *F. S. Earle* (ND, TYPE of *Laciniaria elegantula* Greene); in dry open woods. sand or clay (common), Auburn, Sept. 28, 1899, *F. S. Earle & E. S. Earle*, 95 (G, NY, ND, US); Auburn, Oct. 9, 1898, *F. S. Earle & C. F. Baker* (NY, US), Sept. 18, 1897, *F. S. Earle & C. F. Baker* 1343 (NY), Sept. 20, 1896, *C. F. Baker*, 51 (NY), Oct. 10, 1896, *C. F. Baker*, 50 (NY), Sept. 1900, *F. E. Lloyd & F. S. Earle* (NY). MONTGOMERY Co.: without stated locality, Sept. 21–23, 1909, *W. W. Eggleston*, 5141 (NY). BALDWIN Co.: dry sandy pineland, Bay Minette, Sept. 6, 1912, *F. W. Pennell*, 4549 (P, US). MISSISSIPPI. JACKSON Co.: Biloxi, Sept. 6, 1900, *Tracy & Lloyd*, 560 (NY).

Among the Walter specimens in the British Museum there is none labelled *Anonymos graminifolia*, but one labelled *Chrysocoma affinis* F. 309 (supposedly referring to Fraser) and with Nuttall's annotation *Liatris* in pencil, has been taken as undoubtedly the plant described under the former name. Dr. H. K. Svenson kindly gave me notes and sketches made of the specimen when he was in London in 1938. These show the whole plant, including the basal corm, to be tall. His measurements of the inflorescence are "50 x 1.5 cm." and his comment "narrow". The lower leaves are described as: "1 dm. x 2 mm. glabrous, except within the base which was not closely examined. The involucral bracts were rugose at the apex but not pubescent, slightly ciliate at the margins".

These careful observations, I believe, help us finally to recognize for Walter's type the slender-stemmed, many- and very narrow-leaved plant found especially along the coastal plain of Virginia and the Carolinas that has passed under the general term *Liatris graminifolia* and which I have described as var. *typica*. Elliott (Sk. ii. 274 (1824)) seems to have had this variety in mind when he wrote his description of *L. graminifolia*. The species, as here defined, centers on Walter's specimen and description.

Barton (Mat. Med. ii. 223, t. 49 (1818)) states that after a thorough examination of specimens in the Muhlenberg Herbarium he could not satisfactorily refer a *Liatris* that he had, to any of the species described by Pursh, Michaux, or Willdenow and so named it *L. dubia*, clearly illustrating and carefully

describing it. Although the specimen can unfortunately not be located at present in the herbarium of the Philadelphia Academy of Sciences, Barton's plate and description including "the striated stem covered with a sparse and hispid pubescence, . . . the lower leaves longer and much wider than the upper . . . the upper leaves much smaller and linear, ciliated for the most part at the base", seems clear and directly applicable to many specimens in herbaria collected from back of the coastal plain, from New Jersey to Georgia and distributed under the name *Liatris graminifolia*. Gray (Man. ed. 1, 191 (1848)) first made the combination *L. graminifolia* var. *dubia* and this has been adopted here.

As explained in the discussion of *L. spicata* (see no. 1) Clayton's plant from Virginia and Gronovius' description of it, which was cited by Linnaeus in the description of *Serratula spicata* and in turn by Willdenow in the description of *Liatris spicata* is a plant more commonly recognized now as *L. graminifolia*. Torr. & Gray (Fl. N. Am. ii. 73 (1841)) and Gray (Synop. Fl. i^2. 111 (1884)) had rightly excluded the Gronovian citation by Linnaeus from *L. spicata*. Gray included it in synonymy of *L. graminifolia*, attributing that name to Pursh as the first to define the species correctly. Upon comparing the Barton plate with the Gronovius' and Dillenius' figures, it seems they are very similar, especially when allowing for the effect of cultivation, shown in the Dillenius' figure, and considering Barton's own comment: "this plant is one of a genus nearly all the species of which vary considerably, particularly in those marks usually supposed to be characteristic, as the sessile and pedicellated flowers". Further, as stated above, examination of a floret of the Clayton plant showed the corolla-tube to be pilose within and so are found to be the florets of the so-called *graminifolia* specimens. Clayton's plant may be cited, then, as by Gray, under *L. graminifolia* and more correctly under var. *dubia* which is a large robust plant occurring abundantly in Virginia. While the two varieties, *typica* and *dubia*, overlap in the more eastern part of their range (as for example, two specimens of R. R. Tatnall from Delaware show, that of Sept. 23, 1934, no. 4053, from moist swale, ¼ mi. e. of Ellendale, Sussex Co. (G) resembling *typica* and that of Sept. 16, 1934, no. 2385, from the edge of salt marsh, Fenwick Is.,

Sussex Co. (G) resembling *dubia*) no specimens of the former have come from the mountainous counties to the west.

Still further confusion has been added by Aiton's brief description (Hort. Kew. ed. 1. iii. 138 (1789)) of *Serratula pilosa* as "S. foliis linearibus pilosis, floribus axillaribus longe pedunculatis". Willdenow l. c. adopted the same description when transferring the species to *Liatris*. Although no Aiton specimen was found at the British Museum or Kew in the summer of 1939, there is fortunately a head of Aiton's type "from the Banks Herbarium" at the Gray. From this specimen it can be learned that the head contains at least 10 flowers having a corolla ca. 8 mm. long and pappus 6 mm. long. The almost linear phyllaries are ca. 11 mm. long and 1–1.5 mm. wide and slightly narrowed and ciliate at the tip. The corolla-tube is also slightly pilose within. Also in the British Museum, Mr. Weatherby found a specimen from the herbarium of Goodenough, bearing, in the latter's handwriting, the label, "*Serratula pilosa sp. nov.* 1785". The photograph of this sheet shows a loose inflorescence, that by calculations would measure about 3 dm. in height, bearing heads about 1 cm. in length on leafy peduncles four to six times as long, giving the panicled appearance common in *Liatris* when grown in cultivation. Two slenderer stems on the same sheet, each with one terminal head, may have been longer peduncles cut off lower down on the main stem. However, the size of the heads and character of the phyllaries are in agreement with those of Aiton's specimen. Unfortunately only the very narrow upper leaves are present on any of the stems and so the extent of their pilosity cannot be determined. Elliott (Sk. ii. 277 (1822)) added the note to his description of *L. pilosa* based on Willdenow, Pursh and Nuttall, "This variety is certainly not sufficiently hairy to have merited the trivial name which belongs to this species", and he included questioningly var. *dubia* Barton in synonymy. Support is given this opinion by the note of E. G. Baker found in the National Herbarium in connection with comparisons made of specimens sent him. He states of the type "*Serratula pilosa* Aiton, Hort. Kew. ed. 1. iii. p. 138. (1) The heads are axillary and rather long-peduncled. (2) The heads are rather larger. (3) The plant is pilose. (4) The involucral bracts are narrow and subacute. (5) Lodd. Cab. t. 356 is a figure of the true plant.

The plant is not so thickly pilose as the figure. (6) The true plant seems inseparable from the plant figured in Barton's Med. Bot. ii. t. 49 as *L. dubia*." Until the Aiton specimen may be again examined it seems to this author also that it would be best to include it in such synonymy.

Torr. & Gray (Fl. N. Am. ii. 74 (1841)) described *Liatris pilosa* from the Aiton specimen and one of Mr. Read's collection from Seven Mile Mountain, Va., now in the Philadelphia Herbarium. However, later in Synop. Fl. i². 111 (1884) it was made synonymous with *Liatris graminifolia* var. *dubia* and referred to as a variety with many large heads with the range "sandy pine barrens from New Jersey to Florida and Alabama". Examination of the Read specimen (P), showed a plant with quite broadly lanceolate basal leaves, a spike 18.5 cm. long with 9 distant larger heads ca. 1.5 cm. long and 1.5 cm. wide, and phyllaries with a narrow scarious margin. Of the specimen Torr. & Gray l. c. had written: "Plant nearly as stout as *L. scariosa*", and to the writer too it seems distinctive but more closely related to plants found more abundantly in the mountains, that are here described as *L. turgida*. (see no. 9).

The really pubescent or hirsute variety of this species has been described by Fernald and Griscom from the northern part of its range as *Liatris graminifolia* Willd. var. *lasia*. The plate of *L. pilosa* (Loddiges Cab. t. 356 (1819)) shows a very pubescent plant, which could have belonged to this variety.

With this species has been included a slenderer-stemmed plant, with long basal leaves, typified by a specimen of *J. K. Small*, Aug. 8, 1892, from Iron Mountain, Smyth Co., Va. (NY) and described as *Laciniaria Smallii* Britton (Man. 927 (1901)). Fernald and Griscom, l. c., finding a match for this in their specimen of Sept. 25, 1933, no. 2907 from the desert at Cape Henry, Princess Anne Co., Va. (G) reduced it to a variety of *Liatris graminifolia*, since it could not be separated from that species by any satisfactory characters. Comparison of specimens show that much of this species coming from the mountain regions of south-west Virginia and of adjoining states bear a resemblance to Small's plant from Smyth Co., in the loose infloresencec of sessile, 8–12-flowered heads beyond which the bract-like leaves do not extend, and the generally fewer leaves

(basal ones being longer and wider) with scattered hairs on the under surface. Some specimens are, however, less slender and have a more spike-like inflorescence with heads of appressed almost orbicular phyllaries which on herbarium sheets have been questioningly referred to *L. pilosa* Ait. Until Aiton's specimen may have been found, the evidence given from the single head at Gray and a photograph from the British Museum of Goodenough's specimen match var. *dubia* better than this variety from the mountains. Since the specimen of Read, from Seven Mile Mountain, Va. (P) referred to by Torr. and Gray, Fl. N. Am. ii. 74 (1841) in their discussion of *L. pilosa*, seems to bear closer resemblance to specimens as of Aug. 30, 1912, *E. S. Steele*, no. 24, from Afton, in the Blue Ridge Mountains, Nelson Co., Va. (US), it has been included under the new species *L. turgida*. Though *L. Helleri* Porter is similarly found limited to a small section of the Appalachian Mountains it seems to represent a different segregate and is distinguished from this species by the short pappus, the usually quite glabrous leaves and the few closely arranged heads.

Greene (Pittonia, iv. 316 (1901)) described a species similar to Small's but taller and of more southern range, from a specimen of Oct. 18, 1896, *F. S. Earle*, from Auburn, Lee Co., Ala. (ND) which he called *Laciniaria elegantula*. By the turbinate heads and narrowly lanceolate leaves with ciliate petioles it seems to belong to the *graminifolia* alliance, as here interpreted, rather than to the *Scariosae* as suggested in his description. After careful comparison of this plant with that of Small from Smyth Co., Va. and examination of a number of specimens in the herbaria it seems that one form passes into the other. Yet in the southern part of its range the taller and somewhat stiffer *elegantula* seems to become even stiffer so that it is still more difficult to make sharp delimitation of the most southern Florida material from the Greene type from Alabama. Thus, rather than broaden the conception of *L. Smallii* it has seemed more helpful to split off the more northern, short material as var. *Smallii* from the southern, taller plants, var. *elegantula*, and include therein the stiffer Florida ones. However, that these Florida specimens may be wider variants is again suggested by possible intermediates between this variety and *L. gracilis*, as

in the specimen of Oct. 10, 1914, *R. M. Harper*, no. 225, 2 miles e. of Tallahassee, Leon Co., Fla. (G, NY).

L. graminifolia is by far the largest species of the *Graminifoliae* series and out of it have probably arisen the more localized segregates that follow.

8. Liatris Helleri Porter. Rootstock in older plants large and shallow, usually 5–6 cm. across and 2–4 cm. deep, giving rise to many radical glabrous linear-lanceolate leaves 2–3 dm. long and 6 mm.–1 cm. wide at the middle, diminishing to long, winged, non-ciliate petioles; cauline leaves diminishing uniformly upward in short-pyramidal form to bracts less than the length of the flower-heads; only a few scattered cilia at base of leaves or along veins: inflorescence-bearing stems 1 or 2, rarely more than 2 dm. high, with heads occurring closely and covering one third the length; heads turbinate at the time of flowering, 12–15 mm. high, 7–10-flowered; phyllaries oblong-ovate, with narrow scarious rim and beyond it a finely ciliolate margin; corolla purple, 5–7 mm. in length, slightly pilose within the tube; pappus scanty, barbellate, only 2.5–4 mm. long, i. e. half the length of the corolla and hardly showing beyond the involucre at the time of flowering; achene 2.5–3.5mm. long.—Bull. Torr. Bot. Club, xviii. 147 (1891). *Lacinaria Helleri* Porter, Muhlenbergia i. 6 (1900).

Has been found only on the mountains of North Carolina.—NORTH CAROLINA. Watauga Co.: Blowing Rock Mt., Aug. 18, 1890, *A. A. Heller*, 81 (NY, type (ND, US)), Aug. 18, 1890, *A. A. Heller*, 82 (NY); Blowing Rock, Aug. 17, 1891, *A. B. Seymour*, 22 (G), Aug. 1928, *W. C. Ferguson*, 18 (NY); dry soil, exposed rocky ledge, Blowing Rock, Aug. 1, 1922, *L. F. Randolph & F. R. Randolph*, 1161 (G). Caldwell Co.: ledges of Blowing Rock (elev. 4200′), Aug. 6, 1891, *J. K. Small & A. A. Heller*, 344 (G, NY, P, Q, O, US, F (without no.)); e. of Blowing Rock, (3500′-4000′), Aug. 24, 1893, *A. A. Heller*, 1236 (NY, US); summit of Grandfather Mt., Sept. 25, 1898, *W. M. Canby, C. S. Sargent & J. Muir*, 70 (US); Grandfather Mt., Aug. 9, 1890, *G. B. Sudworth*, 95 (US); peaks of Grandfather Mt., Linville Station, Aug. 11, 1890, *G. B. Sudworth*, 115 (G, US). Avery Co.: high rocks, s. end Beech & Grandfather Mts. (alt. 1650 m.), Sept. 1–2, 1915, *E. S. Steele*, 89 (G, NY). Burke Co.: Table Rock Mt., Aug. 2, 1890, *A. A. Heller*, 81 (NY), 82 (P). Mitchell Co.: mountain meadows, Roan Mt., July 10, 1894, *C. Mohr* (US).

This species, of a very limited mountain range, seems distinctive in its very short pappus since others having both plains- and mountain-habitats have not shown this variation. Like the type, from Blowing Rock Mountain, all other specimens seen are short, indicative of growth only on exposed barren ledges.

It is to be distinguished from varieties *typica* and *dubia* of *L. graminifolia* by these characters and from the shorter var. *Smallii*, which occurs in neighboring mountains of Virginia, by the slender stems bearing few distant heads. *L. turgida* of the same series, has a more robust, elongate inflorescence.

9. Liatris **turgida,** sp. nov., cormo globoso (juniore) vel (vetustiore) irregulari compresso 4–5 cm. lato ad 4–5 caules emittente; caulibus saepe singulis subcrassis saepe rubescentibus nec striatis 6–9 dm. altis glabris vel sparse vel dense pilosis pilis longis albis curvatis; foliis vix numerosis lineari-lanceolatis pagina inferiore et ad basem sparse vel subcopiose pilosis, basalibus plerumque quam apud *L. spicatam* vel *L. graminifoliam* longioribus latioribusque saepe 10–15 cm. longis 1 cm. latis ad basem et ad apicem aequaliter angustatis petiolo alato, superioribus epetiolatis angustioribus fere linearibus ad bracteas quam capitula breviores reductis; spica simplice racemiformi; capitulis inter se 1–2 cm. distantibus sessilibus vel breviter pedicellatis 9–20-floris anthesi subturbinatis 1–1.5 cm. altis et latis; phyllariis plerumque purpureis adpressis glabris marginibus anguste scariosis vel ciliolatis, exterioribus ovatis aliquando fere orbiculatis, interioribus oblongis vel linearibus obtusis ca. 12 mm. longis; corollis purpureis 8–9 mm. longis, tubo intus piloso; achaeniis 4–5 mm. longis, pappo 6–7 mm. longo.—Mountain ridges of southwestern Virginia and adjoining West Virginia and North Carolina.

Rocky woods, road to Royal Orchard, vicinity of Afton in the Blue Ridge Mts., alt. 600 m., Nelson Co., Virginia, Aug. 31, 1912, *E. S. Steele* 24 (US 643319, type).

VIRGINIA. Page Co.: vicinity of Stony Man Mt. (alt. 3600′), Blue Ridge near Luray, Sept. 3, 1901, *E. S. Steele & Mrs. Steele*, 241 (G, NY); vicinity of Stony Man Mt. (alt. 3500′), Blue Ridge near Luray, Aug. 28, 1901, *E. S. Steele & Mrs. Steele*, 241 (NY, US); Honzman, Aug. 1891, *Miss L. Smith* (US); Hawksbill Mt., Aug. 30, 1891, *W. Palmer, W. H. King* (US). Rockingham Co.: vicinity of Elkton, foot and slopes of Blue Ridge Mts., 1918, *E. S. Steele* (G). Augusta Co.: slopes near Jennings Gap, vicinity of Stribling Springs (alt. 570 m.), Aug. 24, 1917, *E. S. Steele*, 23 (G); Little North Mt., vic. of Augusta Springs, Aug. 29, 1908, *E. S. Steele* (US 785731, -3, -4, -5); Elliott's Knob (1200 m.), Aug. 27, 1913, *E. S. Steele*, 56, 72 (US); spur of Elliott's Knob, vicinity of Augusta Springs, Aug. 29, 1908, *E. S. Steele* (US 785727), Sept. 8, 1908 (US 785728, -9); vic. of Fordwick and Craigsville, 1913, *E. S. Steele* (G); Elliott's Knob, summit (alt. 1320 m.), vic. of Augusta Springs, Sept. 2, 1908, *E. S. Steele* (US 785730); Elliott's Knob (alt. 1200 m.), vic. of Augusta Springs, Sept. 2, 1908, *E. S. Steele* (US 785732). Bath

Co.: vic. of Millboro (alt. 480 m.), Aug. 26, 1907, *E. S. Steele* (P); vic. of Millboro, Panther Gap, Sept. 6, 1907, *E. S. Steele* (US 643315); railroad, vic. of Millboro, Aug. 21, 1907, *E. S. Steele* (US 643317); vic. of Millboro (alt. 510 m.) Aug. 29, 1906, *E. S. Steele* (US 590180). NELSON Co.: rocky woods, road to Royal Orchard, vic. of Afton, in the Blue Ridge Mts. (alt. 600 m.), Aug. 31, 1912, *E. S. Steele*, 24 (G, US 643318, -20, -22, -23); Afton, road to Royal Orchard, Sept. 19, 1909, *W. S. McAtee*, 1243, 1245 (US); high cliff, toward Humpback Mt., vic. of Afton, Sept. 13, 1912, *E. S. Steele*, 121 (US). ROCKBRIDGE Co.: North Mt., near Lexington, Aug. 26, 1924, *J. R. Churchill* (G); vicinity of Goshen, alt. 450 m., Sept. 4, 1904, *E. S. Steele* (US 494378, -80); mts., e. of Natural Bridge, Sept. 13, 1907, *E. B. Bartram & B. Long* (US). BEDFORD Co.: without stated locality, Sept. 1, 1871, *A. H. Curtiss* (G, left plant). CRAIG Co.: (and MONROE and ALLEGHANY, W. Va.) Co.: alt. 600 m., Aug. 22, 1903, *E. S. Steele & Mrs. Steele*, 86 (G, NY, US), Aug. 30, 1903, *E. S. Steele & Mrs. Steele*, 166 (G, NY, US); Johns Creek Mt., Aug. 26, 1903, *E. S. Steele* (US); Potts Mt., Aug. 28, 1903, *E. S. Steele* (US). MONTGOMERY Co.: Blacksburg, July 20, 1895, *W. H. Murrill* (NY). GILES Co.: Brush Mt., 2 mis. e. of Newport, Aug. 30, 1933, *E. J. Alexander, T. H. Everett & S. D. Pearson* (NY); Salt Pond Mt., Bald Knob, Aug. 25, 1899, *C. L. Pollard & W. R. Maxon*, 69 (NY, US). WEST VIRGINIA. GREENBRIER Co.: dry upland, 1 mi. s. of White Sulphur Springs, Aug. 10, 1922, *L. F. Randolph and F. R. Randolph*, 1281 (G); White Sulphur Springs, July 16, 1892, *A. Brown* (NY); White Sulphur Springs, July 31, 1877, *G. Guttenberg* (NY); dry woods, White Sulphur Springs, Aug. 27, 1903, *K. K. Mackenzie*, 359 (NY, US). MONROE Co.: Peters Mt., vic. of Old Sweet Springs, Sept. 9, 1905, *E. S. Steele* (US). NORTH CAROLINA. BURKE Co.: dry woods, Jones Ridge, July 22, 1933, *F. W. Hunnewell*, 12982 (G). BUNCOMBE Co.: rocky roadside banks, near Black Mt., Aug. 23, 1927, *K. M. Wiegand & W. E. Manning*, 3176 (G).

It is a pleasure to adopt the specific epithet found on many of the National Herbarium sheets of Mr. E. S. Steele's specimens under another generic name, since his rich collection from the mountains of Virginia has, in our mind, established the identity of the species.

While the species here described may resemble *L. graminifolia* var. *dubia* in shape and distribution of the heads and *L. spicata* in the appressed ovate phyllaries, it cannot be merely referred to as an intermediate between the two. It is to be distinguished from the former by its rather stout stem, the loose raceme-like arrangement of heads showing somewhat appressed ovate, orbicu-

lar or oblong and obtuse-tipped phyllaries, rather than loose, narrowly lanceolate, ciliolate-margined ones, and by lanceolate leaves having scattered hairs over one or both surfaces but lacking the marked basal cilia along a winged petiole. It resembles the variety *Smallii* of *L. graminifolia* most in the nature of the spike, of rather distant sessile heads beyond which the upper bract-like leaves do not extend, but it differs in having a stouter and stiffer rachis, usually with more heads and more orbicular appressed bracts, and in having leaves frequently covered with hairs, a character in which it also differs markedly from *L. spicata*.

There are three specimens (US 643318, -19, -20) of collection no. 24 of E. S. Steele, Aug. 31, 1912, from the vicinity of Afton, Nelson County, and these show variation from an almost glabrous condition to an abundance of scattered hairs; of these, the intermediate condition was chosen as the type, though the description allows for the inclusion of all. Collected only from the mountain ridges of Virginia and the neighboring ones of West Virginia and North Carolina it has frequently been referred to as *L. pilosa* Ait. on herbarium sheets but until Aiton's specimen may have been found (see no. 7) the evidence gathered makes that name seem inapplicable to this plant. However, the one specimen of Read, from Seven Mile Mountain, Va. (P) referred to by Torr. & Gray Fl. N. Am. ii. 74 (1841) in their discussion of *L. pilosa* seems to have a closer resemblance and it is here included. Though *L. Helleri* Porter is similarly found limited to a small section of the mountains, it seems to represent a different segregate, distinguished from this species by the short pappus, the few, though closely placed, heads, and usually quite glabrous leaves.

(To be continued)

Edgar Burton Harger.—In the passing of Mr. Harger, the Connecticut Botanical Society has lost one of its most active and gifted members. He had a large part in the organization of the Society in 1903, became a charter member, and at the first meeting was elected corresponding secretary, an office in which he served with zeal and distinction for twenty-three years. On the death of Charles H. Bissell, he was elected president and served

for nineteen years. In 1945, because of ill health, he was made honorary president.

Harger was born in Oxford, Connecticut, February 5, 1867, lived for most of his life in the Quaker Farms section of that town, and died there February 22, 1946. He was a graduate of the Sheffield Scientific School of Yale University in the class of 1887. He took up the profession of surveyor and served his native town and its vicinity in that capacity for many years. He had been Judge of the Probate Court, Town Clerk and representative in the state legislature; he had also served on the Board of Education in Oxford and as treasurer and clerk of the Oxford Congregational Church, of which he was a life-long member. In 1903, he married Olive Platt, who died in 1926. Four children survive them.

Harger was the author of a number of articles in Rhodora. As a particularly keen and active collector and amateur taxonomist, a member of the committee who compiled the Catalogue of Flowering Plants and Ferns of Connecticut (1910) and the Additions to it (1931), he made a substantial contribution to the advancement of botanical knowledge in the northeastern United States. He was ever ready to share with all comers his extensive knowledge of the local flora and of natural history in general.—ARTHUR E. BLEWITT, Waterbury, Connecticut.

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FRÈRE MARIE-VICTORIN*

(1885–1944)

JAMES KUCYNIAK

IN the passing of Frère Marie-Victorin, the inhabitants of French Canada mourned the loss of one of their noblest sons and foremost contributors to the development of Science among them. Much has appeared in local bulletins and newspapers, notably in those of the French language. A few papers only, perhaps because little was known outside of Quebec of the biographical details of his life, have appeared in the far more numerous scientific periodicals in the United States. This paper is presented in the hope of filling to a certain extent this want.

Frère Marie-Victorin was born in Kingsey Falls, April 3, 1885. Christened Joseph-Louis-Conrad, he was one of the family of 11 of Conrad Kirouac and Philomène Luneau. He was the only one of six sons to reach manhood.

Soon after his birth, the family left Kingsey Falls and moved to Quebec City where his father opened up a profitable grain and flour business. It was here that Joseph-Louis-Conrad spent his early boyhood. He entered the grammar school of St. Sauveur Parish. Heading his class, he was awarded a three year scholarship which enabled him to continue his schooling under the religious order of the Brothers of the Christian Schools.

He soon sensed that his vocation in life was teaching and, to realize it more fully, decided to become a member of the Order which taught him.

* Paper read as "The life and work of Frère Marie-Victorin" at the 50th annual meeting of the Michigan Academy of Science, Arts and Letters, in Ann Arbor, on April 12, 1946.

At the age of sixteen, upon completing his studies at the Académie Commerciale, he entered Mont-de-la-Salle, the Order's motherhouse, in Montreal, which was then located where the Montreal Botanical Garden at present stands.

It was upon being accepted into the community, that he chose the name Frère Marie-Victorin.

In 1903, he began his career as a teacher in the Collège de St-Jérôme, in a city some thirty miles from Montreal, in the foothills of the Laurentians. This was momentarily interrupted by the disclosure of pulmonary tuberculosis. Under doctor's orders, he had to give up teaching and spend as much time as possible outdoors. So it was at twenty that France Bastien found him one day, pensively seated on a moss-covered boulder, with a flora in one hand and trying to tag a name on a broad-leaved *Liliacea*. He gave him a clue by telling the future botanist that it was the "ail-douce", the name under which the French-Canadian habitant knows the dog's-tooth-violet. This bit of information was to start him definitely on his botanical career.

A year later, his condition having improved sufficiently to enable him to return to classes, he was posted to St. Leo's High School, in Westmount, a wealthy suburb of Montreal. That same year, he made the acquaintance of Frère Rolland-Germain who only a little later was to become the faithful companion on the many field trips which were to be undertaken in the years that lay ahead.

His stay at St. Leo's lasted four years after which he was transferred to the Collège de Longueuil, across the St. Lawrence from Montreal. Here he taught algebra, geometry and French composition, but devoted most of his spare time to botany and the organizing of botanical outings with students.

In spite of a heavy working-schedule, he continued making worthy contributions to more advanced botany. He had published some 39 papers before being signalled out to create a department of botany in the now independent Université de Montréal, which had just severed from being a Montreal affiliate of Quebec City's Université de Laval. He was reluctant to leave the Collège de Longueuil and, up until 1928, remained a part-time professor there. However, as the youthful and vigorous Laboratoire de Botanique began to make increasing demands on his

time, he was obliged to give up his teaching assignment at Longueuil and devote full time to the Université.

Taken up with the preparation of lectures and mapping out of "lab" sessions, the selecting and forming of assistants who were to remain with him and carry on after he was gone, left little time for publishing. It was fully two years before any paper of technical importance appeared: the first number of the "Contributions du Laboratoire de botanique", now known as the "Contributions de l'Institut botanique de l'Université de Montréal" and which consist of original memoirs or reprints from various periodicals, principally the Mémoires de la Société Royale du Canada and Le Naturaliste Canadien. For his work on the "Filicinées du Québec", the Université de Montréal awarded him a Docteur ès Sciences. This was the second in the series of Contributions, and the first in a contemplated set of fascicles of a vast undertaking which would eventually form a complete and critical study of the flora of Quebec. Two years later, a similar paper appeared on clubmosses and in 1927 an issue each was devoted respectively to horsetails and gymnosperms. After another lapse of two years, a study on the *Liliiflorae* was published and this was followed in as many years by his treatment of the *Araceae*. Fully cognizant of the fact that, some seventeen years earlier, he had himself made a vibrant appeal for the urgent publication of a new illustrated flora of the Province of Quebec, he realized that at the rate the fascicles appeared it would be a good many years before an indispensable flora of the kind was completed. He therefore interrupted the series and started work upon what at first was eyed as a less ambitious project. This was to be a manual which, from the outset, was affectionately termed the "petite flore", in which illustrations, a description of and interesting notes on the species found within the inhabited regions of Quebec were to be treated. The result was *La Flore laurentienne*, a quarto of some 927 pages in which 1917 species of flowering plants and vascular cryptogams were described and illustrated, preceded by a phytogeographical study of the region in which a geobotanical foundation of Quebec was originally outlined. Another innovation was the introduction of chromosome numbers for the first time in a flora. Taking time out to write the *Flore*

did not put an end to the Contributions which during his lifetime reached 51 in number, while others have appeared subsequently.

On June 10, 1923, together with several other enthusiastic field-naturalists, he founded the Société Canadienne d'Histoire Naturelle which, in its unassuming way, has contributed much to the diffusion of scientific knowledge through French-Canada. For years, he was its president. The society's annual activities were brought to a close in a meeting devoted to what was termed the presidential address. This served as an excellent platform for the setting in motion of certain reforms or giving birth to many long-needed institutions. One can't help but admire the courage that it took to make as frank and unflattering an inventory of the shortcomings and of the attitude of French-Canadians towards pure science as is found in "La Science et nous" which Frère Marie-Victorin delivered in 1926. Not content to relate this sad plight of affairs, a remedy to the situation was proposed in advice given to educationalists as well as in the selection of studies which should constitute the curriculum in a faculty of science. These are the basic ideas of the 1930 address entitled "Les Sciences naturelles dans l'Enseignement supérieur". Five years later, with "La tâche des Naturalistes canadiens-français", an attempt was made to plot a future course offering new vistas in which research could be undertaken after having taken into full account the intellectual capacities and available resources. "La Science et notre Vie nationale" in 1938 ended this series with an examination of what had been done to date and reiterating a vigorous appeal in favor of what was deemed necessary for the future.

In its turn, the Société fostered the idea of young naturalists' clubs to encourage all schoolchildren to take a closer interest in the study of nature. Frère Marie-Victorin followed its activities with the deepest interest. The countless articles he has written for their column, which appears weekly in the local French-Canadian newspaper "Le Devoir", or the leaflets of popular information known as the "Tracts des C. J. N.", issued at irregular intervals by the Société, will testify to that effect. The Cercles des Jeunes Naturalistes, as these clubs are known, have under his watchful eye grown increasingly and to-day reach almost a thousand in number, listing some 30,000 members in all, to whom

half a million of the leaflets mentioned earlier are distributed annually. To further the satisfactory work carried out already, a more widespread development was inaugurated in the production of a program of radio broadcasts, known as "La Cité des Plantes", broadcast over a network of 13 Quebec radio stations. This consists of 26 weekly, fifteen-minute chats devoted to introducing students the province over to the striking aspects of the plant world.

Time unfortunately permits but mention here of the "Ecole de l'Eveil", where some 40 youngsters ranging in age from three to five, meet for an hour each week in a kindergarten of natural history.

Hardly one to encourage the French-speaking workers in science to carry on in the isolated spheres of their respective fields, the secretary of the newly-formed Société, together with Léo Pariseau, Edouard Montpetit and Louis Dalbis founded the ACFAS, the French-Canadian equivalent of the A.A.A.S. Breaking away from an attempt to make it an affiliate of the Association Française pour l'Avancement des Sciences, it has survived well on its own. Though connected with the group in an official capacity over two relatively short periods, being its secretary for the 1924–1925 term and its president in 1937–38, he had nonetheless, in an unofficial capacity, contributed considerably to its progress.

In 1929, having just returned from a lengthy trip through Africa, the Middle East and Europe, and highly impressed with the work being carried out in the Cape of Good Hope, Cairo, the Canary Islands and Cologne, Frère Marie-Victorin was firmly convinced of the necessity of a botanical garden for a city as large as Montreal. On the 14th of December 1929, "Le jardin botanique de Montréal" was a plea made before the members of the Société which, within six years, was well on its way to full realization. Under the pressure of a vigorous campaign backing the idea, the municipality's Director of Departments called upon Frère Marie-Victorin, fifteen years ago last April 8, to draft the initial project for a botanical garden. It took a little over a month to turn in the requested report. Within a year, an original sum was voted and preliminary work, such as draining and soil-leveling, was carried out on what was then known as Maison-

neuve Park. A greenhouse was erected as well as a small pavilion for administrational purposes. Definite realization of the project was begun in earnest with the creation on April 24, 1936, of the Municipal Commission of the Montreal Botanical Garden with Frère Marie-Victorin as its director. Intelligent planning and many arduous hours were put into this undertaking which, with the generous collaboration of the federal, provincial and municipal authorities, accomplished much within a short period of three years: the administration building with its offices, lecture rooms, auditorium seating some 500 people, "labs," library, herbarium and museum, the 22 service or propagation greenhouses, the gardens of ornamental plants and of economic plants, to mention but a few.

The outbreak of war in 1939, together with a change in the provincial government, brought the intense activity centred on the building of the Garden to practically a standstill. Frère Marie-Victorin lived, however, to see almost three-quarters of the project realized and was ever confident that its completion was only a matter of time.

One would think that, with the heavy duties imposed upon him by the founding of a department of botany, a task which in itself obliges one to keep a closer eye upon the rapid developments occurring therein, would have constantly kept Frère Marie-Victorin the year round within easy reach of the prospering department of botany. If, however, in Eastern Canada, the Institut is to-day considered first and foremost in the field of taxonomy and phytogeography, it is thanks to the enthusiastic initiative which its founder put into field trips, a practice which, no matter how numerous the obligations nor how urgent the affairs of office, was never relayed to second place when the season for botanizing was in full swing. These surveys were carried out on quite a heavy scale for almost a quarter of a century. Though the Université was in no position financially to back all of them, the expenses were at times defrayed by those taking part themselves and, for good measure, by grants from the National Research Council, the Federal Ministry of Mines, the Provincial Ministry of Game and Fisheries and the Quebec Office des Recherches. The first region to be explored botanically was the district of Lake St. John to which the summers of 1920 and 1921

were devoted, the region itself being subsequently re-visited in 1932, 1936 and 1937. Two summers later, a trip was made into the heart of the Gaspé peninsula where climbing one of the steep slopes in the wilderness proved too strenuous a physical effort for Frère Marie-Victorin. A severe heart-attack did not put an end to his taking part in further botanical excursions but limited them to those places which required but little bodily exertion to cover. The next five seasons were devoted to intense field work in the Mingan Archipelago as well as Anticosti Island. Several species new to science, *Cirsium minganense*, *Botrychium minganense*, *Scirpus Rollandii*, *Solidago Victorinii*, *Aster anticostensis*, were among the rewarding yields of this geologically as well as biologically interesting area. From 1930 on, the field trips were no longer of lengthy duration, seldom lasting more than a fortnight. Two successive seasons were devoted to combing the Baie des Chaleurs region and adjoining New Brunwsick. Initial work in Ontario was begun in 1932 and was centred mainly about the Great Lakes and the Georgian Bay which were re-visited in the summers of 1936 and 1937. In 1933, the upper Ottawa and the Abitibi districts were covered. During the course of a rather long season in 1936, several collecting trips were made to the little-known though highly-promising terrain of the Eastern Townships. A four-months sojourn in Cuba, in the winter of 1938–1939, aided and abetted by Hermano Léon, resulted in the publication of an illustrated 400-page memoir, devoted entirely to the field trips carried out there. A second volume appeared covering subsequent visits to this island, while a third was in preparation before his untimely end. Reams of unpublished notes taken in minute detail on each herborization are housed in the archives of the Institut Botanique.

When not undertaking major field trips, Frère Marie-Victorin, in company with the faithful co-worker on so many of them, together with a lab assistant or two, would spend an afternoon, sometimes a day or even a long week-end botanizing within easy reach of Montreal, visiting such localities as the shores of the St. Lawrence near Longueuil; St. Jérôme, noted for its boggy lakes; Oka with its sand dunes and stands of pine and sweet-fern; St. Janvier, Farnham and Lanoraie with their interesting stretches of peat-bog; Cap-Rouge with its fresh-water estuary and charac-

teristic flora of unique items, such as *Gentiana Victorinii* and *Cicuta Victorinii;* Ancienne-Lorette where the pleasure of botanizing was coupled with the nostalgia of many agreeable boyhood memories and countless other places perhaps just as interesting botanically but far too numerous to enumerate here.

For some time, Frère Marie-Victorin had been hoping to pay a visit to Black Lake where E. T. Wherry, after the geologist Harvie, had reported the rare serpentinicolous Oregon cliff-brake (*Cheilanthes siliquosa*). This station is one of the only three known in Eastern America, the others being Mt. Albert in Gaspé and Owen Sound, Ontario. So, early on the Saturday morning of July 15th, with Frère Rolland-Germain and three others, Frère Marie-Victorin set out for the station in the asbestos centre of the Province, a little over a hundred miles from Montreal. Stopping to botanize at several interesting localities on the way, it was well after lunch when their destination was reached and time to think of the return journey now that several stands of this exceedingly exacting fern had been found. Homeward-bound, a brief stop was made at St. Norbert where Frère Marie-Victorin dropped in to chat with an old couple of relatives and call on a childhood friend in the village where he had spent so many summers as a youngster. When more than halfway on the way home, at Ste.Rosalie, some two or at most three miles east of St. Hyacinthe, a car coming out of the latter city crashed head-on into the party of botanists. The shock of the collision was too violent for Frère Marie-Victorin's heart. After an unsuccessful attempt to administer a dose of the ever present "coramine" which he always carried with him, he passed away by the roadside before efficient medical assistance could be administered.

Montreal Botanical Garden

Dicentra eximia in Vermont.—A single plant of *Dicentra eximia* (Ker.) Torr. was found on the western outskirts of Brattleboro, Vermont, by Dr. Somers H. Sturgis of Cambridge on May 10, 1946. It was growing in partial shade between a country road and a mountain brook on a high bank composed of mixed soils which appeared to have been deposited by freshets. Unfortunately, Dr. Sturgis dug the plant for his wild garden

without realizing its interest as a rare adventitious species in New England. I revisited the station later but was unable to find any other specimens. Diagnostic fragments of the plant have been deposited in the Herbarium of the New England Botanical Club for the record. Only one other New England specimen has been brought to my attention, viz., from Rutland, Massachusetts, coll. Mrs. Rufus B. Dodge.—Richard J. Eaton, Lincoln, Massachusetts

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THE GENUS LIATRIS

L. O. Gaiser

(*Continued from page 263*)

10. Liatris gracilis Pursh. Corm small, globose, up to 3 cm. in diameter, in tall robust plants giving rise to a dense spreading fibrous root-system; stems slender to stiff and thick (up to 0.7 cm. in diameter at the base), often reddish, glabrous or more generally softly cinereous-pubescent, 2–10 dm. tall: leaves glabrous, ciliate or with few scattered hairs, punctate, short and numerous, lanceolate to linear; longest basal ones about 2 dm. long, 0.5–1 cm. wide, bluntly lanceolate, narrowed to a winged petiole with scattered cilia along the margin; other leaves reduced upwards to bracts, 1–2 cm. long and 1 mm. wide; inflorescence a simple raceme often ca. 3 dm. long, sometimes becoming paniculate and twice as long; heads on short filiform, villous pedicels, at least as long as and often longer than the heads, divaricate and frequently at right angles to the pubescent rachis, often, in paniculate inflorescences, becoming slender bracteolate peduncles 15 cm. long: heads the smallest of any species of the genus, 7–9 mm. long and about as wide when the flowers are open, of 4–6 flowers; phyllaries rather thin, oblong, obtuse, rarely tending to become acute, sometimes pubescent, ciliate on the margin, loosely erect: outer ones short, ovate, 2 mm. long and ca. 1 mm. wide; inner ones 5.5 mm. long and ca. 1.5 mm. wide; corolla from deep lavender to violet, 5–7 mm. long, densely pilose within the upper part of the tube and lower part of the throat; pappus hardly as long as the corolla, ca. 5 mm., short-barbellate; achene ca. 3 mm. long—Fl. Amer. Sept. 508 (1814); Gray, Synop. Fl. i^{2}. 111 (1884). *Laciniaria gracilis* O. Ktze., Rev. Gen. 1349 (1891), not, sensu Small, Man. S. E. Fl. 1334 (1933). *Liatris pauciflosculosa* Nutt. Jour. Acad. Phil. vii. 71 (1834). *L. lanceolata* Bertol. Misc. Bot. v. 11, t. 3 (1846). *Lacinaria laxa* Small, Bull. Torr. Bot. Club, xxv. 472 (1898) and Man. S. E. Fl. 1334 (1933). *Liatris laxa* K. Sch. in Just, Jahresb. xxvi^{1}. 378 (1900).

South Carolina, Georgia, Alabama and especially Florida.—SOUTH CAROLINA. Beaufort Co.: dry woods, St. Helena Isl., Sept. 1882, *A. Cuthbert* (F); St. Helena Isl., Sept. 1892, *A. Cuthbert* (NY); dry barrens, St. Helena Isl., Sept. 1894, *A. Cuthbert* (F); flat pine woods, St. Helena Isl., Oct. 1902, *A. Cuthbert* ((NY 874) F); Oct. 1903, *A. Cuthbert* (F). GEORGIA. Without stated locality: *Nuttall* (P), *L. Conte* (P), 1844, *Dr. Harden* (P); 1831, *Gates* (NY). Co. undetermined: Atlantic & Gulf Rwy., *Chapman* (NY). Glynn Co.: sandy pine land, Brunswick, Oct. 10, 1912, *F. W. Pennell*, 4837 (P). Berrien Co.: rather dry flat pine barrens, ca. 1½ mis. s. of Tifton, Sept. 26, 1902, *R. M. Harper*, 1683 (G, NY, US). Thomas Co.: Thomasville, Oct. 16, 1903, *Taylor* (G). Decatur Co.: Bainbridge, 1875, *A. H. Curtiss* (US). FLORIDA. Without stated locality: *Chapman* (G, NY, P, US), *Chapman*, 52 (US), *A. W. Chapman, ex Herb. G. Thurber* (G), *A. P. Garber* (US), *Leavenworth* (G, NY), *Rugel* (US). Co. undetermined: southern Florida, *Chapman* (NY); pine barrens, *Chapman, ex Herb. J. A. Lowell* (G); Fort Dallas, *J. G. C.* (NY). Duval Co.: dry pine barrens, Jacksonville, Oct. 25, 1894, *A. H. Curtiss*, 5312 (G, NY, US); dry pine barrens, near Jacksonville, Oct., *A. H. Curtiss*, 1181 (G, NY, P, Q, US); Jacksonville, Oct. 25, 1893, *A. H. Curtiss*, 4446 (NY, US); Jacksonville, Nov. 1891, *Herb. W. G. Farlow* (G); Jacksonville, Oct. 18, 1898, *A. H. Curtiss* (G); dry pine barrens, near Jacksonville, Oct. 18, 1898, *A. H. Curtiss*, 6290 (NC, F); Jacksonville, Nov. 14, 1901, *J. K. Small & G. V. Nash*, 369 (NY). Columbia Co.: dry open woods, Camp Oleno, Oct. 1, 1939, *Watson & Murrill* (F). Hamilton Co.: dry woods on Suwannee R., White Springs, Sept. 30, 1941, *E. West & Miss L. Arnold* (F). Jefferson Co.: high pine-oak woods, n. of Monticello, Oct. 7, 1940, *W. A. Murrill* (F). Gadsden Co.: without locality, Oct. 24, 1880, *C. Mohr* (US); open pinelands, w. part of county, Aug. 30, 1936, *H. Foster* 115 (F). Jackson Co.: Cypress, Oct. 21, 1941, *R. A. Knight* (F). Calhoun Co.: without locality, Oct. 25, 1944, *R. A. Knight* (F). Liberty Co.: sandy pine barrens, Aspalaga, Oct. 1897, *Biltmore Herb.*, 577a (G, NY, ND). Franklin Co.: sandy pine barrens, Apalachicola, Oct. 3, 1882, *Biltmore Herb.*, 577b (G, NY, NC, Q, US); dry pine barrens; Apalachicola, *B. F. Saurman* (P); Apalachicola, 1867, *B. F. Saurman* (P). Washington Co.: Chipley, Oct. 13, 1943, *R. A. Knight* (F). Bay Co.: dry sandy ground, Lynn Haven, Oct. 14, 1921, *C. Billington* (US). Okaloosa Co.: Crestview, Oct. 23, 1939, *R. A. Knight* (F); Crestview, Oct. 9, 1939, *Mrs. G. Barrow* (F). Santa Rosa Co.: sandy pine land, Milligan, Sept. 10, 1912, *F. W. Pennell* (NY, US). Saint Johns Co.: St. Augustine, *M. C. Reynolds* (NY); pine barrens, *M. C. Reynolds* (US). Putnam Co.: flatwoods, S. E. Adm. Bldg., Welaka, Oct. 26, 1944, *A. M. Laessle* (F).

Bradford Co.: Starke, Nov. 1893, *Miss G. Gilbert* (G). Union Co.: on dry ground near highway n. of Worthington Springs, Oct. 20, 1945, *H. H. Hume* (F). Alachua Co.: high open land, Warren's Cave, Gainesville, Oct. 5, 1927, *G. F. Weber & E. West* (F); roadside, Archer Rd., Gainesville, Oct. 31, 1931, *Miss L. Arnold* (F); upper slopes, Devil's Millhopper, Gainesville, Oct. 23, 1932, *Miss L. Arnold* (F). Taylor Co.: 9 mis. s. of Perry, Oct. 8, 1940, *W. A. Murrill* (F). Flagler Co.: roadside just e. of Bunnell, Oct. 10, 1940, *E. West and Miss L. Arnold* (F). Marion Co.: dry woods, Belleview, Sept. 15, 1927, *O. F. Burger & E. West* (F). Volusia Co.: low sandy ground, De Land road, Nov. 6, 1944, *Mrs. H. T. Butts* (OA). Seminole Co.: high pineland, Altamonte Springs, Oct. 4, 1928, *E. West* (F). Orange Co.: Wekiwa Springs, Dec. 5, 1929, *H. N. Moldenke*, 1920 (NY); Wekiwa Springs, Sept. 25, 1929, *H. O'Neill* (US, F); high pineland, Orlando, Sept. 24, 1927, *O. F. Burger & E. West* (F); high pineland, Zellwood, Sept. 24, 1927, *O. F. Burger & E. West* (F). Lake Co.: 4 mis. s. w. of Astor Park, Oct. 13, 1940, *W. A. Murrill* (F). Sumter Co.: 3 mis. s. of St. Catherines, Oct. 14, 1943, *W. B. Tisdale* (F). Citrus Co.: Inverness, *M. A. Noble* (P); sandy dry oak-pine woods, 1 mi. s. of Floral City, Oct. 16, 1945, *H. H. Hume* (F). Hernando Co.: vic. of Brooksville, Sept. 21, Oct. 19, 22, 1919, *R. N. Jones* (US). Brevard Co.: low pine barrens, Okeechobee, Sept. 26, 1903, *A. Fredholm*, 6027 (G); scrub oakland, Okeechobee region, Oct. 20, 1903, *A. Fredholm*, 6148 (G). Hillsborough Co.: Tampa, Sept. 1877, *A. P. Garber* (P); dry sand, Oct. 13, 1904, *A. Fredholm*, 6424 (G); in a high hammock, Riverview, Oct. 8, 1930, *F. S. Blanton*, 6794 (US); flatwoods n. of Riverview, Oct. 19, 1945, *L. O. Gaiser, Mrs. H. T. Butts, Miss L. Arnold*, Aug. 19, 1945 (F). Pinellas Co.: Tarpon Springs, Aug. 1894, *C. S. Williamson* (P); sandy open or light wooded space, St. Petersburg, Sept. 17, 1932, *G. M. Hocking* (F). Indian River Co.: between Fellsmere and Sebastian, Aug. 13, 1925, *R. M. Harper*, 53 (US). Okeechobee Co.: pineland, Okeechobee, Oct. 12, 1941, *J. H. Davis* (F). Manatee Co.: Tampa Bay, *Herb. G. Thurber* (G); Bradentown, Sept. 29, 1900, *S. M. Tracy* 7105 (G, NY, US); Manatee, 1889, *J. H. Simpson* (US); flatwoods, at Palma Sola, Bradentown, Oct. 10, 1920, *A. Cuthbert* (F); flatwoods, n. of Parrish, Aug. 19, 1945, *L. O. Gaiser, Mrs. H. T. Butts, Miss L. Arnold* (F). Sarasota Co.: air field in flatwoods, Venice, Aug. 19, 1945, *L. O. Gaiser, Mrs. H. T. Butts, Miss L. Arnold* (F). Hendry Co.: wet pinelands, Indian Reservation, Jan. 15, 1942, *J. H. Davis* (F). Lee Co.: in pineland, vicinity of Fort Myers, Oct. 29, 1916, *Miss J. P. Standley*, 415 (G, P, US); pine flatwoods, 5 mis. s. of Ft. Myers, Oct. 20, 1942, *J. H. Davis* (F). Broward Co.: pinelands, Fort Lauderdale, Nov. 19–25, 1903, *J. K. Small & J. J. Carter*,

1470 (NY); Fort Lauderdale, Nov. 1903, *J. K. Small* & *J. J. Carter*, 1069 (P). Dade Co.: Cape Florida, Mar. 14, 1892, *Mrs. J. H. Simpson*, 537 (G (NY, type of *Lacinaria laxa* Small)); pinelands, w. of Silver Palm, Nov. 21, 1916, *J. K. Small*, 7982 (NY); pinelands, w. of Silver Palm, Nov. 21, 1916, *J. K. Small*, 7974 (G, NY, F); pinelands w. of Rockdale, Nov. 18, 1916, *J. K. Small*, 7899 (NY); pineland prairie, Tamiami Trail, w. of Miami, Dec. 19, 1919, *J. K. Small, N. L. Britton,* & *M. De Winkeler*, 9372 (NY); pinelands, near Camp Jackson ca. 35 mis. s. w. of Miami, Jan. 7–10, 1909, *J. K. Small* & *J. J. Carter*, 3043 (NY); pinelands, w. of Miami, Apr. 7, 1904, *N. L. Britton*, 475 (NY); pinelands, between Cocoanut Grove and Cutler, Oct. 31–Nov. 4, 1903, *J. K. Small* & *J. J. Carter*, 719 (NY, P); pinelands, between Cocoanut Grove and Cutler, Oct. 31–Nov. 4, 1903, *J. K. Small* & *J. J. Carter*, 753 (NY); Buena Vista, Jan. 21, 1930, *H. N. Moldenke*, 4850 (NY); s. of Miami, Mar. 27, 1930, *H. N. Moldenke*, 5858 (NY); e. of Naranja, Jan. 14, 1909, *J. K. Small & J. J. Carter* (P). ALABAMA. Without stated locality: *Gates* (G, NY, P, B, isotypes of *L. lanceolata* Bert.), *C. W. Short* (P), *Herb. G. Thurber* (G), *Herb. Torrey* (NY). Co. undetermined: pine woods, *Buckley* (NY). Covington Co.: Blue Springs, near McRae, Sept. 13, 1912, *F. W. Pennell*, 4615 (P). Baldwin Co.: Gateswood, Oct. 31, 1903, *S. M. Tracy*, 8559 (G, NY, ND, T, US). Mobile Co.: sandy dry pine woods, Mobile, Oct. 1878, *C. Mohr* (US); dry sandy pine barrens, Mobile, Oct. 1880, *C. Mohr* (US); Mobile, 1878, *C. Mohr* (US); mixed wood, s. of Mobile, Sept. 24, 1912, *H. H. Bartlett*, 3226 (G, US); 3217, in part (US); Whistler, Oct. 10, 1884, *C. Mohr* (US); Spring Hill, Aug. 3, 1897, *B. F. Bush*, 150 (NY); Spring Hill, Sept. 28, 1878, *C. Mohr* (NY, US), Oct. 1890 (NY), Oct. 20 (US); hillside, Spring Hill, Sept. 1919, *E. W. Graves*, 1324 (US); pine woods, w. of Spring Hill, Aug. 1918, *E. W. Graves*, 594 (US); pine ridges, Sept. 28, 1879, *C. Mohr* (NY).

It was possible to compare a photograph of the type specimen of *L. gracilis* Pursh, obtained by Mr. Weatherby at Kew, and two specimens at the Philadelphia Academy of Science, of Gates from Alabama, one of which is probably the co-type, if not the type, of *L. paucifloscula* Nutt. While the phyllaries are slightly acute in one Gates specimen they are obtuse in the other and with their filiform, divaricate pedicels, closely resemble the Pursh specimen, except for the fact that Pursh described his plant as glabrous while Nuttall described the stem as puberulent. Since such a surface character alone has not been of diacritical significance in this genus, and there is a wide variation in the degree of

pubescence in this generally ciliate species the two names seem synonymous, as does also *L. lanceolata* Bertol. of which isotypes were seen in four herbaria (G, NY, P, B).

Careful examination of the plant of J. H. Simpson, no. 537, from Cape Florida (NY) which was described by Small (Bull. Torr. Bot. Club, xxv. 472 (1898)) as *Lacinaria laxa* showed no decisive characters by which it could be separated from *L. gracilis*.

Abounding chiefly in Florida, though occurring also in Southern Georgia and Alabama, *L. gracilis* is distinguishable from *L. graminifolia* var. *elegantula* which overlaps its northern range, by its smaller heads, flowers and achenes.

11. Liatris regimontis (Small) K. Sch. Corm globose, 1.5–2 cm. in diameter; stem slender, glabrous, striate, 4–7 dm. high: leaves few, linear, mostly glabrous with marginal cilia, but sometimes with hairs on upper surface as well as beneath; basal ones 6–10 cm. long and ca. 5 mm. wide having a few cilia at base: inflorescence long, covering one half to three quarters of the length of the stem, with numerous sessile or peduncled heads forming a spike or slightly branched panicle: heads 6–12-flowered, ca. 10 mm. long, cylindrical but with the phyllaries slightly spreading rather than appressed, the mid-vein showing rather distinctly and forming a rather rigid keel; outer phyllaries ovate, mucronate-tipped, and with entire margins, the inner ovate-lanceolate with somewhat membranous margins; corolla 7 mm. long with appressed hairs at the base of the throat and upper part of the tube, sometimes appearing up to the base of the lobes; pappus barbellate, 3.5–4 mm. long: achene 3–3.5 mm. long.—Just, Bot. Jahresb. xxvi. pt. 1, 378 (1900). *Lacinaria regimontis* Small, Bull. Torr. Bot. Club, xxv. 473 (1898). *Liatris carinata* Coker, Pl. Life of Hartsville, 108 (1912). *Laciniaria carinata* Small. Fl. S. E. U. S. 1174 (1903).

Eastward from the mountains in Virginia, North and South Carolina.—VIRGINIA. Wythe Co.: Wytheville, *H. Shriver*, 9874 (P). NORTH CAROLINA. Forsyth Co.: Winston Salem, Sept. 22, 1927, *E. T. Wherry & F. W. Pennell*, 14348 (P). Wake Co.: Raleigh, Sept. 6, 1908, *W. W. Eggleston*, 4052 (G, US); Burke Co.: Bridgewater, Sept. 20, 1927, *E. T. Wherry & F. W. Pennell*, 14297 (P); Wayne Co.: sand ridge, near Goldsboro, Sept. 3, 1938, *R. K. Godfrey*, 6562 (G, P). Moore Co.: Pinehurst, Aug.–Sept. 1897, *O. Katzenstein* (G); sandy places, Sept. 1, 1940, *P. O. Schallert* (G). Cleveland Co.: King's Mt. and vicinity (alt. 600′–1300′), Aug. 27–30, 1894, *J. K. Small* (NY, type); King's Mt. (alt. 2600′–3000′), Sept. 10, 1908, *W. W. Eggleston*, 4073 (NY, US); woodland, near King's Mt., Oct. 7,

1902, *Biltmore Herb.*, 15006 (NY). Scotland Co.: 10 mis. s. of Aberdeen, Oct. 12, 1938, *R. K. Godfrey*, 6941 (G); sandhill, 10 mis. n. of Laurenburg, July 14, 1938, *R. K. Godfrey*, 5045 (G). SOUTH CAROLINA. Co. undetermined: dry soil, Santee Canal, Oct., *H. W. Ravenel* (G). Chesterfield Co.: 1 mi. w. of McBee, Sept. 7, 1939, *R. K. Godfrey*, 8055 (G, NY). Anderson Co.: dry slopes, Anderson, Aug. 10, 1912, *J. Davis* (NY); dry pine woods, Anderson, Aug. 15, 1919, *J. Davis*, 7794 (US). Oconee Co.: without stated locality, *A. P. Anderson*, Sept. 9, 1898, 1529, Sept. 11, 1898, 1546 (US); Darlington Co.: sandy pine woods, Society Hill (common), *M. A. Curtis* (G); low pine lands, Society Hill (1 stem to left), Sept. 8, 1904, *Biltmore Herb.*, 14935a (NY). Kershaw Co.: 3 mis. w. of Bethune, Sept. 7, 1939, *R. K. Godfrey*, 8014 (G, NY). Sumter Co.: local, Sumter, Oct. 21, 1913, *Herb. E. B. Bartram*, 3248 (P). Lexington Co.: 6 mis. s. of Columbia, Aug. 7, 1939, *R. K. Godfrey & R. M. Tryon*, 1247 (G, NY). Edgefield Co.: sandy ridges, Sept. 22, 1883, *J. D. Smith*, 34 (US). Georgetown Co.: pine barren clearing, 5 mis. s. of Andrews, Sept. 13, 1939, *R. K. Godfrey*, 8190 (G, NY); sandy pine woods, Oct. 12, 1934, *F. G. Tarbox Jr.*, 175-2, 175-3 (NY). Aiken Co.: Aiken, Sept. 12–15, 1909, *W. W. Eggleston*, 5047 (G, NY). Berkeley Co.: sandy soil, Monk's Corner, Oct. 14, 1912, *F. W. Pennell*, 4888 (NY); near Monk's Corner, Sept. 29, 1856, *L. R. Gibbs* (NY). Orangeburg Co.: Eutauville, Sept. 6–11, 1909, *W. W. Eggleston*, 4952, 4989 (NY), 4966 (NY, P), 5008 (G, NY). Beaufort Co.: dry sandy bluff, Sept. 5, 1904, *Biltmore Herb.*, 14935b (NY). GEORGIA. Without stated locality: *Croom* (G).

This species is found in North and South Carolina, east of the mountains, where also the varieties *typica* and *dubia* of *L. graminifolia* occur. It is best distinguished from those varieties, having leaves with prominent hairs along the petioles or on the surfaces and turbinate heads with thin, ciliolate-margined phyllaries, by almost glabrous leaves and almost entire-margined, somewhat keeled phyllaries, the outer appearing revolute.

Laciniaria carinata described by Small, l. c., from the same general region, was included in Small, Man. S. E. Fl. 1333 (1933) under *Lacinaria secunda* (Ell.) Small. Examination of the specimens bearing this name in the herbarium (NY) shows a closer relationship to *L. regimontis* in the size of the heads and corolla-tubes (ca. 7 mm. long in *regimontis* and 10–12 mm. long in *secunda*) and in the lack of the puberulent stem of *L. secunda*. The phyllaries are perhaps slightly more membranous but if not "thick lax-tipped", as *regimontis* was described by Small, are

nevertheless spreading and show the midvein projecting at the tip. It is here included in the synonymy of *L. regimontis*.

The corolla-tube in all these specimens is pilose at the base of the throat, above the attachment of the filaments, and so shows relationship to the species of the *Graminifoliae* series rather than to *L. microcephala*, which has a smooth corolla-tube and small cylindrical heads of appressed bracts. When found in a young inflorescence stage it casually resembles and could be confused with this species.

Series IV. Pauciflorae. Herbs of one or two stems, glabrous or short-pubescent, with numerous short, linear to linear-lanceolate leaves; inflorescence spicate, racemose or simply paniculate, usually erect (often reclining in *L. secunda*), of slender long cylindrical compact heads 1–2 cm. long, usually 3–6-flowered, with appressed glabrous, thin linear-acuminate to -acute phyllaries; corolla-tube 10–12 mm. long, with only very few hairs within and few scattered ones at the base without; achene ca. 4 mm. long.—From sandy pinelands of the coastal plain from North Carolina to Florida, Alabama and Louisiana.

a. Slender sessile crowded heads densely erect, giving a narrow stiff spicate inflorescence, glabrous or short-pubescent; corolla-tube with slight pilosity within the base of the throat.....12. *L. Chapmanii.*
a. Slender short-pedicellate heads less crowded in loose racemes or simple panicles; corolla-tube with only a few scattered hairs within and outside at the base of the tube....b.
  b. Stem and leaves glabrous; inflorescence erect, racemose or paniculate.....13. *L. pauciflora.*
  b. Stem short-pubescent; leaves pubescent, or ciliate toward the base; inflorescence racemose, with heads frequently secund.....14. *L. secunda.*

12. Liatris Chapmanii Torr. & Gray. Corm rounded or ovoid up to 2 cm. in diameter: stem usually single, stiff, minutely cinereous-pubescent or glabrous, very leafy, 3–7.5 dm. tall; leaves very numerous, linear-lanceolate, inconspicuously punctate, finely pubescent or glabrous, lower ones ca. 1.5 dm. long, and 5–10 mm. wide, forming a rosette at the base of the stem; upper leaves narrowed below the middle into a slender margined petiole, gradually reduced, 1.5 cm. long at the base of the spike; inflorescence a very dense, narrow spike, 1–3.5 dm. long, of slender, 3–5-flowered, cylindrical, nearly sessile heads, 1–1.8 cm. long, erect and generally closely appressed to the rachis; phyllaries oblong-lanceolate, acute or mucronulate, glabrous and with narrow scarious margins, sometimes purple; corolla phlox-purple, rarely white, ca. 12 mm. long, with very slight pilosity, if any, within the tube at the base of the throat; achene 4–5 mm. long;

pappus 9–11 mm. long and barbellulate, with barbellae about equal to or twice the diameter of the seta.—Fl. N. Am. ii. 502 (1843); Chapman, Fl. So. U. S. 191 (1860); Gray, Synopt. Fl. i^2. 112 (1884). *Laciniaria Chapmanii* O. Ktze. Rev. Gen. i. 349 (1891). *Laciniaria Deamiae* Lunell, Amer. Midl. Nat. ii. 163 (1912). *Lacinaria Chapmanii* var. *longifolia* Nash, Bull. Torr. Bot. Club, xxiii. 106 (1896).

Georgia and Florida.—GEORGIA. Decatur Co.: without locality, Sept. 15, 1880, *Dr. E. A. Smith* (NY). FLORIDA. Without stated locality: *Chapman, ex Herb. C. Mohr* (US); *Curtiss, ex Herb. U. S. Dept. Agr.* (US); *ex Herb. Park Davis Co.*, 3496 (US). Co. undetermined: sandhills, *A. W. Chapman* (G, (NY type)); on arid sandhills, *Chapman* (G); southern Florida, *A. W. Chapman* (NY, US). Leon Co.: Bellair, Sept. 3, 1895, *G. V. Nash*, 2547 (G, NY, US, ND). Gadsden Co.: dry sandy pine ridges, near Bristol & Quincy, Oct. 24, 1895, *C. Mohr* (US); on arid sandhills, Sept., *Chapman* (G); open pinelands, western part of county, Aug. 30, 1936, *H. Foster*, 113 (F). Franklin Co.: dry sandy ridges, near Apalachicola, July 12, 1895, *ex Biltmore Herb.*, 4114a (G, NY, US, ND); dry pine barrens, near Apalachicola, Oct. *A. H. Curtiss*, 5441 (NY); Apalachicola, Oct. *Curtiss*, (NY); dry pine barrens, near Apalachicola, Oct. 1888, *A. H. Curtiss*, 1182 ((G, US, without date) NY, ND)); St. Vincent Island, Oct. 30, 1910, *W. L. McAtee*, 1730, (US); St. Vincent Island, Oct. 30, 1910, *W. L. McAtee*, 1743 (US). Okaloosa Co.: East Pass, *S. M. Tracy*, 6362 (G, US, NC). Escambia Co.: barren scrubs near Pensacola, Sept. 26, 1901, *A. H. Curtiss*, 6918 (G, NY, US, Q); high dry pine barrens, w. side of Escambia Bay, Sept. 20, 1910, *R. M. Harper*, 88 (G, NY, US). Putnam Co.: with low turkey-oak, along n. boundary, Welaka, April 28, 1940, *A. M. Laessle* (F). Volusia Co.: dry scrub, Tomoka Ave., near Ormond, Sept. 24, 1944, *Mrs. H. T. Butts* (OA); flatwoods, s. of Seville, Sept. 17, 1943, *G. West & Miss L. Arnold* (F). Orange Co.: flatwoods, Orlando, Oct. 18, 1929, *E. West & De Vane* (F); sandhills, Windermere, Sept. 19, 1929, *F. Vasku* (F). Hernando Co.: Choocochattee Hammock, near Brooksville, Aug. 26, 1922, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 10604 (NY, F). Brevard Co.: Okeechobee region, Aug. 13, 1903, *A. Fredholm*, 5962 (G). Hillsborough Co.: Tampa, Aug. 24, 1895, *G. V. Nash*, 2473 (G (NY, type of *Lacinaria Chapmannii* var. *longifolia* Nash) US, ND, F). Pinellas Co.: sandy waste, near Veteran City, 8 mis. w. of St. Petersburg, Sept. 29, 1907, *Mrs. C. C. Deam*, 2804 (G, NY, US, I, cotypes of *Laciniaria Deamiae* Lunnell). Highlands Co.: sandhills, near De Soto city, Aug. 31, 1922, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 10683 (G, NY); Avon Park, Sept. 5, 1934, *J. K. Small, E. West, J. B. McFarlin* (F). Manatee Co.: (albino) high bank of Mana-

tee River, Sept. 17, 1916, *A. Cuthbert* (F); high ridges, Bradentown, Sept. 16, 1916, *A. Cuthbert* (F); high bank of Manatee River, near Palma Sola, Sept. 16, 1916, *A. Cuthbert* (F); sandhills along Manatee River, Bradentown, Sept. 17, 1916, *A. Cuthbert* (F). SAINT LUCIE Co.: low dune, 8 mis. s. of Fort Pierce, Oct. 4, 1941, *E. Kurz* (F). LEE Co.: pinelands, Deering Reservation, Cutler, July 20, 1924, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 11538 (G, NY). COLLIER Co.: Cypress Head, s. of Naples, Aug. 29, 1922, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 10619 (NY); in Ceratiola scrub, Naples, Oct. 17, 1941, *J. H. Davis* (F). DADE Co.: in sandy pineland, Buena Vista, Jan. 21, 1930, *H. N. Moldenke*, 483a (NY); in dry sandy pineland, Buena Vista, Miami, Mar. 4, 1930, *H. N. Moldenke*, 6540 (NY); in pinelands, between Cocoanut Grove & Cutler, Oct. 31–Nov. 4, 1903, *J. K. Small & J. J. Carter*, 710 (NY); Miami, Sept. 1, 1939, *E. West* (F); in sand, Homestead, Sept. 7, 1928, *G. F. Weber* (F).

L. Chapmanii is to be distinguished from *L. pauciflora* Pursh, also occurring in Florida, by its stiffer, narrow spike of crowded, erect, almost sessile heads rather than the usually pedicellate ones in an erect, simple panicle or raceme characteristic of that species. No distinctive characters could be found in the type of *Laciniaria Deamiae* Lunell to differentiate it from this species, nor did the length of basal leaves seem significant enough for varietal recognition of the Nash specimen from Tampa.

13. LIATRIS PAUCIFLORA Pursh. Corm small, globose, 1–2 cm. in diameter: stem generally single, erect but slender, glabrous, striate, leafy, 2–5 dm. tall: leaves narrow, inconspicuously punctate; basal ones not abundant, glabrous with a few cilia on the petiole, 7–10 cm. long, reduced upwards to 1 cm. long and 1 mm. wide at the base of the inflorescence: this 10–25 cm. long, a loose raceme or simple panicle: heads on very slender pedicels 3–5 cm. long, 3–6-flowered; corollas projecting well beyond the tips of the involucre; phyllaries glabrous, ovate-lanceolate with acute to acuminate tips; corolla phlox-purple, 11–12 mm. long, with a few hairs scattered over the entire inner surface and outer base of the tube; achene 4–5 mm. long and sharply pointed; pappus 9–11 mm. long, with short barbellae about equal to or twice the diameter of the seta.—Fl. Am. Sept. ii. 510 (1814); DC. Prod. v. 131 (1838); Gray, Synopt. Fl. i². 112 (1884), in part. *Laciniaria pauciflora* O. Ktze. Rev. Gen. i. 349 (1891).

Mostly northern Florida.—FLORIDA. Co. UNDETERMINED: east Florida, *Lt. Alden* (NY); dry sand, high pineland, *Dr. Leavenworth* (NY). HAMILTON Co.: dry woods, on Suwannee R. White Springs, Sept. 30, 1941, *E. West & Miss L. Arnold* (F).

Suwannee Co.: dry pine barrens, near Live Oak, Sept. 12, 1901, *A. H. Curtiss*, 6896 (G, NY, US, Q). Walton Co.: dry pine barrens, between Freeport & Portland, Sept. 23, 1910, *R. M. Harper*, 90 (US right plant). Putnam Co.: just n. of Orange Springs, Sept. 23, 1939, *Watson & Murrill* (F). Alachua Co.: blackjack ridge, w. of Archer, Aug. 25, 1922, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 10585 (G, NY); sandy open soil, Gainesville, Aug. 31, 1927, *O. F. Burger* (F); dry oak woods, Rochelle, Sept. 5, 1927, *E. West* (F). Dixie Co.: pineland, 10 mis. w. of Shamrock, Aug. 22, 1937, *Pasture Survey* (F). Marion Co.: high pine woods, Belleview, Sept. 15, 1927, *O. F. Burger & E. West* (F). Levy Co.: Bronson, Sept. 9, 1936, *Pasture Survey* (F). Orange Co.: Clarcona, Jan. 20, 1900, *Miss M. Meislahn*, 148a (US); Clarcona, Sept. 19, 1889, *Miss M. Meislahn*, 39 (US); Clarcona, Dec. 20, 1899, *Miss M. Meislahn*, 138a (US). Hernando Co.: dry pineland, near Weekiwachee Spring, Sept. 4, 1937, *Mrs. M. F. Baker* (F). Lake Co.: vicinity of Eustis, Aug. 16–25, 1894, *G. V. Nash*, 1711 (G, NY, US, ND). Hillsborough Co.: low pineland, 12 mis. n. of Tampa, Sept. 15, 1930, *F. S. Blanton & H. O'Neill*, 6639 (US); Tampa Bay, ex Herb. *G. Thurber* (G); Tampa Bay, Oct. 1877, *A. P. Garber* (US (P, left plant)); sandhill, Hillsborough (plant to right), Sept. 17, 1904, *A. Fredholm*, 6392 (G).

For discussion see the next species.

14. Liatris secunda Ell. Corm small and globose, 1–2 cm. in diameter; stem usually one, slender, not stiff, puberulent, frequently reclining and 3–5 dm. in length; leaves not abundant, lanceolate, inconspicuously punctate, ciliate along the margin and towards the base; basal ones lanceolate, 7–10 cm. long, 5–8 mm. wide; upper ones reducing in length to 1 cm. and in width to 2 mm. wide: inflorescence a loose terminal raceme 1.5–2 dm. long with 3–6-flowered heads ca. 1.5 cm. long, borne single on peduncles 2–3 cm. long, frequently secund if plant reclining; phyllaries oblong-lanceolate, acute, sometimes acuminate, glabrous but finely ciliolate along the margin; corolla phlox-purple, very slender, tubular, 11–12 mm. long, with a few hairs inside the full length of the tube and sometimes with few scattered hairs on outside at base of the tube; achene ca. 4 mm. long; pappus 8–9 mm. long, barbellulate, barbellae about three times the diameter of the seta.—Sk. ii. 278 (1822(?)); Torr. & Gray, Fl. N. Am. ii. 71 (1841); Chapman, Fl. So. U. S. 191 (1860). *Lacinaria secunda* (Ell.) Small Man. S. E. Fl. 1331 (1933).

From the southern coastal plain region of North Carolina through South Carolina, Georgia, and central and western Florida, to Alabama and Louisiana.—NORTH CAROLINA. Without stated locality: *ex Herb. Chapman* (NY). New Han-

OVER Co.: dry sand barrens, Wilmington, Oct. 2, 1908, *E. B. Bartram* (NY); dry sand, Wilmington, Oct. 4, 1908, Oct. 3, 1909, *E. B. Bartram* (P); Wilmington, Aug. 1842, *C. S. Williamson* (P); near Wilmington, Oct. 1867, *W. M. Canby* (NY, P, US); 3 mis. s. of Wilmington, July 25, 1922, *L. F. Randolph & F. Randolph*, 1023 (G); Wilmington, 1885, *G. McCarthy* (US); Wilmington, 1880, Sept. 22, 1882, *T. F. Wood* (US); Greenfield Lake, at Wilmington, Aug. 7, 1938, *R. K. Godfrey & B. W. Wells*, 5914, (G). BRUNSWICK Co.: in coarse sand of long-leaf pine barren, 10 mis. n. of Southport, Sept. 12, 1941, *R. K. Godfrey*, 1189 (G, NY). SOUTH CAROLINA. Without stated locality: *Gibbes*, (G). CHESTERFIELD Co.: among scrub-oak & long-leaf pine, 1 mi. w. of McBee, Sept. 7, 1939, *R. K. Godfrey*, 8084 (G, NY, P). DARLINGTON Co.: Society Hill, *M. A. Curtiss* (G); sand hills, across Blast Creek, Hartsville (one plant), Aug. 22, 1908, *W. C. Coker* (NY). LEXINGTON Co.: sandy burned clearing, 14 mis. s. of Columbia, Aug. 7, 1939, *R. K. Godfrey & R. M. Tyron*, 1309 (G, NY); sandy pine woods, near Columbia, Sept. 1889, *Miss Crawford* (US); 2 mis. n. e. of Columbia, Sept. 25, 1883, *J. D. Smith*, 32 (US). EDGEFIELD Co.: sandy blackjack-pine ridges, Sept. 22, 1883, *J. D. Smith*, 31 (G without no., US). GEORGETOWN Co.: in swamp, near Georgetown, Aug. 1935, *W. Rhoades* (G); Georgetown, Sept. 9, 1933, *F. G. Tarbox*, 710 (NY); pine barren clearing, 5 mis. s. of Georgetown, Sept. 9, 1939, *R. K. Godfrey*, 8123 (G, NY, P). AIKEN Co.: (albino) Aiken, Sept. 12–15, 1909, *W. W. Eggleston*, 5044 (G, NY, US, P); Aiken, Sept. 1869, *H. W. Ravenel* (US). GEORGIA. Without stated locality: *ex Herb. Boston Soc. Nat. Hist.* (G). RICHMOND Co.: barrens, Augusta, Sept. 1897, *A. Cuthbert* (NY, F); sand hills, Augusta, *A. Cuthbert*, Sept. 29, 1898, 310 (NY), Sept. 10, 1903 (NY), Sept. 8, 1902 (US); sand hills, sterile ridges, Augusta, Sept. 4, 1902, *A. Cuthbert*, 785 (F); sand hills, no. of Augusta, Oct. 16, 1937, *J. H. Pyron & R. McVaugh*, 1866 (US); Augusta, *G. McCarthy*, Aug. 1888 (NY, ND), Sept. 20, 1888 (US); Augusta, 1849, *S. T. Olney* (G); Augusta, *S. T. Olney* (G); about Augusta, *S. T. Olney & J. Metcalf* (NY); BURKE Co.: without stated locality, Sept. 10, 1897, *H. Hopkins*, 39 (NY). WAYNE Co.: dry sandy ridge between Doctortown and Jesup, Sept. 14, 1903, *R. M. Harper*, 1997 (G, NY, US). FLORIDA. WALTON Co.: between Freeport & Portland, Sept. 23, 1910, *R. M. Harper*, 90 ((G, NY (US, two plants to the left)). OKALOOSA Co.: East Pass, Aug. 31, 1899, *S. M. Tracy*, 6362 (G, NY, ND, NC). SANTA ROSA Co.: dry sandy pineland, Milton, Sept. 9, 1912, *F. W. Pennell*, 4571 (NY). ORANGE Co.: vacant lot, Orlando, Aug. 16, 1929, *C. J. Williams* (F); high pineland, Gotha, Sept. 2, 1929, *F. Vasku* (F); pineland, Windermere, Aug. 27, 1929, *F. Vasku* (F); sandhill, Windermere, Sept. 10, 1929, *F. Vasku* (F);

high pineland, Windermere, Sept. 1, 1929, *E. West* (F); sandy woods, Windermere, Sept. 30, 1929, *E. West* (F); HILLSBOROUGH Co.: sandhills, Tampa, Sept. 17, 1904, *A. Fredholm*, 6392 ((G plant to left); Tampa, Oct. 1877, *A. P. Garber* (G, P (plant to right)). ALABAMA. COVINGTON Co.: 1–2 mis. e. of Florala, Sept. 13, 1912, *F. W. Pennell*, 4631 (NY). LOUISIANA. Co. UNDETERMINED: S. W. Louisiana, *ex Herb. C. Mohr* (US).

Liatris pauciflora was described by Pursh as a glabrous plant, from a collection by Bartram in Georgia. Elliott, later described *L. secunda* as a reclining species, with short-pubescent stem, growing on the summits of dry sandhills and common near Columbia, South Carolina. This has generally passed into synonymy under *L. pauciflora*. Since, in his flora, Pursh made two divisions of the genus, tuberous and non-tuberous, and placed *L. pauciflora* in the latter group (DeCandolle doing likewise), it was judged by Nash (Bull. Torr. Bot. Club. xxii. 152 (1895)) that the description of this Pursh species was not that of a *Liatris* at all and that *Liatris secunda* Ell. was the legitimate name for *L. pauciflora* of Gray (Synop. Fl. l. c.).

There is in the Banks Herbarium at the British Museum a specimen[1] of *L. pauciflora* Pursh, a photograph of which was obtained by Mr. Weatherby, labelled in pencil in the same handwriting as is the type of *L. gracilis* Pursh, which would therefore seem to be the type of *L. pauciflora* Pursh. Examination of the photograph confirms the glabrous nature of the rachis of the inflorescence and a part of the stem, though much of the stem, the basal leaves and the underground stem are lacking (the last omission perhaps explaining the error Pursh made in classifying the plant). The heads are noticeably borne severally along slender, erect, peduncles 3–5 cm. long, thus making the inflorescence a simple panicle. The heads and phyllaries are as described by Pursh. Specimens paralleling this type have been seen in herbaria mostly from the northern half of peninsular Florida.

[1] Though the type specimen bears no collector's name, date or place of collection, in the recently published diary of John Bartram (Diary of a Journey through the Carolinas, Georgia, and Florida, July 1, 1765 to Apr. 10, 1766, John Bartram, annotated by F. Harper, Trans. Amer. Phil. Soc. n. s. xxxiii. pt. 1, 1–120 (1942)), mention is made of *Serratula* at Turtle Creek in Georgia, which would be Glynn Co., and very near the Florida border. Also in the report of William Bartram (Travels in Georgia and Florida, 1773–74, a report to Dr. John Fothergill, William Bartram, annotated by F. Harper, Trans. Amer. Phil. Soc. n. s. xxxiii. pt. 2, 121–242 (1943) reference to *Serratula* in Georgia is found twice: (1) Brier Creek, in Screven or Burke Co. and (2) the Ridge, referred to as south of the forking of the Tulagoo from the Savannah R., probably in Madison or Oglethorpe county, from the route shown on the map.

Though the type of *L. secunda* Ell. is unfortunately no longer available, there is at the Gray Herbarium a small envelope labelled "*L. secunda* Ell. ex. Herb. Ell.", from which it is possible to see the nature of the puberulent stem and to make flower-measurements. The cylindrical head is 1.5 cm. long and compact as that of *L. punctata* but with thin glabrous phyllaries, an achene only 4 mm. long, and the pappus not conspicuously plumose. The corolla when boiled is 12 mm. long, and has only a few scattered hairs within and without the tube. Specimens having similar characters are often reclining and the heads of the loose raceme often become secund. Herbaria show numerous specimens from the New Hanover and Brunswick coastal region of North Carolina, from South Carolina and Georgia but fewer from Florida and they are mostly from the western counties. The characters of the flower-parts of glaborus specimens growing in sandhills through the northern half of peninsular Florida that match the type of *L. pauciflora* are very similar to those of *L. secunda* but the plants are usually erect, the leaves are narrowly linear and the heads are frequently borne in a loose erect panicle. The only puberulent specimens seen from peninsular Florida came from Windermere, Gotha and Orlando, three very adjacent stations in Orange County, and one plant each of collections by Garber and Fredholm labelled as from Tampa and Hillsborough respectively. These two latter specimens might possibly have been obtained by the collectors elsewhere. Since the more northern specimens are persistently puberulent we are led to retain *L. secunda* Ell. as a separate species, as did Small, though not in synonymy with *L. carinata* Small (see no. 11).

Confusion has resulted from failure to recognize the almost glabrous specimens from North and South Carolina of so-called *L. carinata* as resembling species of the *Graminifoliae* rather than the *Pauciflorae* series and in its given synonymy with *L. secunda*. As pointed out (see no. 11) *L. regimontis*, here including *L. carinata*, has a corolla only 7–8 mm. long and is quite pilose within at the base of the tube whereas the corolla of *L. secunda* is 10–12 mm. long and has only a few scattered hairs within and without. The length of the heads too is greater, 1.5–2 cm. long in *L. secunda* and *L. pauciflora* and only about 1 cm. in *L. regimontis*. When these confusing glabrous specimens of the Caro-

linas are thus classified as *L. regimontis* of the *Graminifoliae*, the *Pauciflorae* specimens of the same region all prove to be puberulent and a match for *L. secunda* Ell., just as the wholly glabrous specimens in Florida give confirmation to the species *L. pauciflora*. No glabrous specimens from Georgia have been seen except the type plant. Though no locality was given by Pursh for Bartram's plant from Georgia it could possibly have been collected very near the Florida border (see last footnote).

That a glabrous species, *L. pauciflora*, should be generally found in a more southerly region than a related puberulent species of the same series, *L. secunda*, is in strong contrast to finding the rare hirsute form in the widespread species *L. spicata*, in some few plants of its variety *resinosa* from Florida and Louisiana. It is however in agreement with the condition obtaining in the series *Tenuifoliae*, where likewise the glabrous *L. laevigata* is limited to peninsular Florida, while the related *L. tenuifolia*, with a tendency to ciliate leaves, extends northward to South Carolina.

Series V. Tenuifoliae. Herbs showing the tallest and most slender spikes of the genus, attaining a height of 12 dm., with basal rosettes of long filiform to linear coriaceous leaves, diminishing abruptly to short setaceous bracts; heads 4–6-flowered, ca. 1 cm. long, but not compact in appearance when mature due to the few narrow linear thin phyllaries that are not appressed when the flowers are open; corolla-tube non-pilose within but with short hairs on the filaments of the stamens; achenes 3–4 mm. long.

From dry and moist lands from South Carolina to Big Pine Key, Florida.

a. Plants with scattered hairs along stem; leaves dull, sparsely ciliate, very narrow, filiform; of more northern distribution ..... 15. *L. tenuifolia.*

a. Plants completely glabrous; leaves glossy, coriaceous, non-ciliate and linear; peninsular Florida only ..... 16. *L. laevigata.*

15. Liatris tenuifolia Nutt. Corm small, rounded, up to 2 cm. in diameter: stems slender and spicate, 6–12 dm. high: leaves glabrous and punctate; lower ones long, linear, filiform, 10–25 cm. long, not more than 2 mm. wide, broadening at the point of attachment and often with scattered cilia at their bases, crowded into a rosette from which cauline leaves abruptly diminish to erect setaceous bracts 1 cm. or more long; heads 4–5-flowered, in a long, lax spike, long raceme or narrow panicle, sessile or on

short, very slender pedicels 6–9 mm. long; phyllaries glabrous, the outer acute and only about half as long as the inner oblong-elliptic ones, 6–10 mm. long, with petaloid margin, frequently purple and with midvein often terminating in a short cusp; corolla phlox-purple, rarely white, 6–8 mm. long, smooth within, but filaments of the stamens with short hairs; achene ca. 3 mm. long, pappus 5–7 mm. long, barbellate, and not plumose to the naked eye; flowers said to be fragrant.[1]—Nutt. Gen. ii. 131 (1818); Ell. Sk. ii. 275 (1822?). *Laciniaria tenuifolia* O. Ktze. Rev. Gen. Pl. i. 349 (1891).

South Carolina to Florida and Alabama.—STATE UNDETERMINED. *Torrey* (NY), *Chapman*, 7 (NY), *Leavenworth* (NY). SOUTH CAROLINA. Without stated locality: Hb. Gibbes (G, NY). CHESTERFIELD Co.: among scrub-oak and long-leaf pine, 1 mi. w. of McBee, Sept. 7, 1939, *R. K. Godfrey*, 8074 (G, NY). DARLINGTON Co.: Society Hill, *M. A. Curtis* (G). RICHLAND Co.: sandy woods, near Columbia, Sept. 25, 1883, *J. D. Smith*, 2032 (US). AIKEN Co.: Aiken, Sept. 12–15, 1909, *W. W. Eggleston*, 5045 (G, NY, US); dry scrub, Aiken, Sept. 1866, *H. W. Ravenel* (G); Aiken, Sept. 1869, *H. W. R.* (US). GEORGIA. Without stated locality: *Boykin* (G, NY). RICHMOND Co.: pine & blackjack hills, Summerville near Augusta, Sept. 21, 1883, *J. D. Smith*, 2033 (US); dry pine barrens, Augusta, *A. Cuthbert* (F); sandhills, high ridges, Augusta, Sept. 1899, *A. Cuthbert*, 312 (NY); sandhills, Augusta, Sept. 1899, *A. Cuthbert*, 1132 (F); sandhills, 1 mi. n. of Mt. Lebanon Church, Oct. 17, 1937, *J. H. Pyron & R. McVaugh*, 1895 (US). BURKE Co.: without stated locality, Sept. 15, 1897, *M. H. Hopkins*, 38 (NY). SCREVEN Co.: oak ridge, in s. e. part of county, Sept. 29, 1940, *D. Eyles*, 7554 (G). CRISP Co.: sandy soil, Cordele, Sept. 18, 1901, *Biltmore Herb.*, 4116e (US). SUMTER Co.: high sandy banks of Flint R., Sept. 10, 1900, *R. M. Harper*, 634 (G, NY, US). FLORIDA. Without stated locality: *Chapman* (US, 4557 & 31492); *Nuttall* (P, isotype); *Chapman*, ex Herb. *C. Mohr* (US), ex Herb. *Sartwell* (US); *Chapman* (NY); *Dr. Burroughs* (NY); *Curtiss*, 188 (NY). DUVAL Co.: dry pine barrens, Jacksonville, Oct. 24, 1894, *A. H. Curtiss*, 5310 (G, US); near Jacksonville, Oct. 13, 1893, *A. H. Curtiss*, 4447 (US); s. of Jacksonville, Aug. 1896, *L. H. Lighthipe*, 339 (NY). COLUMBIA Co.: north of Camp Oleno, Oct. 6, 1940, *W. A. Murrill* (F). HAMILTON Co.: dry woods on Suwannee R., White Springs, Sept. 30, 1941, *E. West & Miss L. Arnold* (F). LEON Co.: Tallahassee, *N. K. Berg* (NY); Tallahassee, Oct. 7, 1895, *Biltmore Herb.*, 576 (US). GADSDEN Co.: dry soil, River Junction, Sept. 22, 1900, *Biltmore Herb.*, 4116d (US); high pine-oak-woods near Havana, Oct. 6, 1940, *W. A. Murrill* (F). JACKSON Co.: without locality, Aug. 23, 1880, *E. A. Smith* (US).

[1] See introduction.

Franklin Co.: dry pine barrens, Apalachicola, 1867, *B. F. Saurman* (Q). Bay Co.: sandy moist open ground, Lynn Haven, Oct. 12, 1921, *C. Billington* (US). Walton Co.: dry sandy soil, Argyle, Aug. 25, 1899, *Biltmore Herb.*, 4116b (US). Santa Rosa Co.: dry sandy pineland, Sept. 9, 1912, *F. W. Pennell*, 4575 (NY). Alachua Co.: dry fields, Gainesville, Oct. 7, 1928, *G. F. Weber* (F); flatwoods, Gainesville, Oct. 14, 1927, *Miss L. Arnold* (F); open fields, Archer Road, Gainesville, Oct. 12, 1931, *Miss L. Arnold* (F). Gilchrist Co.: dry woods, 6 mis. e. of Trenton, Oct. 5, 1940, *E. West & Miss L. Arnold* (F). Taylor Co.: 9 mis. s. of Perry, Oct. 8, 1940, *W. A. Murrill* (F). Marion Co.: 4 mis. s. of Belleview, Oct. 13, 1940, *W. A. Murrill* (F). Levy Co.: flatwoods, 5 mis. e. of Otter Creek, Nov. 11, 1939, *Watson & W. A. Murrill* (F). Volusia Co.: (typical and albino) dry soil, pine woods, s. of New Smyrna, Oct. 14, 1944, *Mrs. H. T. Butts* (OA). Orange Co.: Lake Mary, Nov. 17, 1902, *S. M. Tracy* (US); pinelands, Gotha, Aug. 22, 1929, *E. West* (F); flatwoods, Orlando, Oct. 9, 1929, *F. Vasku* (F); (albino) flatwoods, Orlando, Oct. 22, 1929, *De Vane & West* (F). Lake Co.: 5 mis. s. w. of Astor Park, Oct. 13, 1940, *W. A. Murrill* (F). Citrus Co.: sandy dry oak-pine-woods, on U. S. 41, 1 mi. n. of Inverness, Oct. 16, 1945, *H. H. Hume* (F). Polk Co.: Haines City, Nov. 1917, *R. H. Young* (US); Fort Meade, April 4, 1880, *J. D. Smith* (US); sandy place, July 27, 1940, *P. O. Schallert* (G). Hillsborough Co.: Tampa, Oct. 1877, *A. P. Garber* (G, US); dry sand, Oct. 13, 1904, *A. Fredholm*, 6422 (G). Manatee Co.: Bradentown, Aug. 10, 1900, *S. M. Tracy*, 7100 (NY, T); flatwoods, Bradentown, Oct. 30, 1916, Oct. 27, 1920, *A. Cuthbert* (F). Dade Co.: in tropical pineland, Miami, Nov. 28, 1933, *F. Duckett*, 242 (US); Buena Vista, Jan. 21, 1930, *H. N. Moldenke*, 483a (NY); w. of Rockdale, Nov. 18, 1916, *J. K. Small*, 7907 (NY). ALABAMA. Without stated locality: *ex. Herb. G. Thurber* (G). Cherokee Co.: dry soil, dry ridges, near Bristol, Oct. 25, 1895, *C. Mohr* (US). Covington Co.: Blue Springs, near McRae, Sept. 13, 1912, *F. W. Pennell*, 4616 (NY).

See discussion following the next species, *L. laevigata* Nutt.

16. Liatris laevigata Nutt. Corm stout, globular or somewhat broadened, larger than that of *L. tenuifolia*, up to 4 cm. in diameter; stems shorter, frequently not attaining the extreme height of that species: lower leaves entirely glabrous, punctate, involute, long, linear, but not filiform, 2–3 dm. long, 2–8 mm. wide, broadening and sheath-like at the point of attachment, shining, coriaceous, in a rosette at the base, diminishing abruptly to short erect setaceous glabrous bracts: spike sometimes becoming panicled, 3–6 dm. long; heads 4–6-flowered, usually sessile or on slender pedicels 6–9 mm. long; outer phyllaries short,

narrowly acute: the inner oblong, elliptic, 6–10 mm. long, often with obtuse petaloid tips and frequently purple; corolla phlox-purple, 7–8 mm. long, smooth internally but filaments of stamens with short hairs; achenes ca. 3 mm. long; pappus 5–7 mm. long, barbellate, and not plumose to the naked eye.—Nutt. Trans. Amer. Phil. Soc. n. s. vii. 285 (1841). *Liatris tenuifolia* β Torr. & Gray, Fl. N. Am. ii. 70 (1841). *Liatris tenuifolia* var. *laevigata* (Nutt.) Robinson, Proc. Amer. Acad. Arts and Sci. xlvii. 201 (1911). *Liatris tenuifolia* var. *quadriflora* Chapm. Fl. S. U. S. ed. 2, Suppl. 626 (1883). *Laciniaria laevigata* (Nutt.), Small, Fl. S. E. U. S. 1175 (1903).

Found only in peninsular Florida, along the coast as far south as Big Pine Key.—FLORIDA. Without stated locality: Nov. 26, *J. Read* (P, isotype). Duval Co.: vicinity of Mayport and Jacksonville, 1870–76, *H. D. Keeler* (NY, ND); St. Nicholas, Oct. 1897, *L. H. Lighthipe* (NY), dry pine barrens, near Jacksonville, Oct., *A. H. Curtiss*, 1174 (US, 63074); near Jacksonville, 1893, *A. H. Curtiss*, 4447 (NY); dry pine barrens, near Jacksonville, Oct. 7, 1898, *A. H. Curtiss*, 6289 (F). Baker Co.: Glen Saint Mary, Oct. 1927, *H. Hume* (G). Franklin Co.: Apalachicola, *Biltmore Herb.*, 4116a (NY, Q). Saint Johns Co.: flatwoods, Road 14A, near Spuds, Oct. 14, 1941, *E. West & Miss L. Arnold* (F). Clay Co.: cut-over pine woods, Keystone Heights, Oct. 11, 1945, *H. Hume, Nevins & Miss L. Arnold* (F). Putnam Co.: scrubby flatwoods, n. of Beecher Springs, Welaka, Sept. 28, 1940, *A. M. Laessle* (F). Alachua Co.: south of Prairie, Alachua, Oct. 24, 1940, *W. A. Murrill* (F). Flagler Co.: flatwoods, 5 mis. e. of Co. line, Hwy. 28, Andalusia, Oct. 10, 1940, *E. West & Miss L. Arnold* (F). Marion Co.: in a scrub, Ocala National Forest, Sept. 12, 1929, *H. O'Neill* (US, F). Volusia Co.: pine wood, dry sandy soil, s. of New Smyrna, Oct. 14, 1944, *Mrs. H. T. Butts* (OA). Seminole Co.: high pinelands, Sanford, Sept. 22, 1927, *O. F. Burger & E. West* (F). Lake Co.: Eustis, Aug. 16–25, 1894, *G. V. Nash*, 1669 (G, NY, P, ND, US); Eustis, Sept. 10, 1895, *G. V. Nash*, 2599 (G, NY, ND, US); sandy soil, Eustis, Sept. 10, 1900, *Biltmore Herb.* 4116e (US); open sand, 5 mis. e. of Leesburg, Aug. 17, 1939, *W. A. Murrill* (F). Orange Co.: Clarcona, Sept. 25, 1899, *Miss M. Meislahn*, 72a (US); high pineland, Wekiwa Springs, Sept. 25, 1929, *H. O'Neill* (US); flatwoods, Gotha, Aug. 30, 1929, *F. Vasku* (F); pineland, Windermere, Sept. 3, 1929, *F. Vasku* (F); sandhills, Windermere, Sept. 10, 1929, *F. Vasku* (F). Brevard Co.: pine barrens, Indian River Region, Nov. 9, 1902, *A. Fredholm*, 5565 (G); sandy soil, Cocoa, Sept. 5, 1936, *A. S. Rhoads* (F). Osceola Co.: low pinelands, Deer Park, Sept. 24, 1927, *O. F. Burger & E. West* (F). Hillsborough Co.: flatwoods, w. of Plant City, Aug. 19, 1945, *L. O. Gaiser, Mrs. H. T. Butts & Miss L. Arnold*

(F). Okeechobee Co.: Okeechobee, Sept. 26, 1903, *A. Fredholm*, 6022 (G); pine woods, Okeechobee, Oct. 12, 1941, *J. H. Davis* (F). Manatee Co.: Bradentown, Aug. 10, 1900, *S. M. Tracy*, 7100 (G, US). Martin Co.: pine flatwoods, w. of Stuart, Nov. 23, 1942, *J. H. Davis* (F). Sarasota Co.: airfields in flatwoods, Venice, Aug. 18, 1945, *L. O. Gaiser, Mrs. H. T. Butts & Miss L. Arnold* (F). Charlotte Co.: flatwoods ditch, s. of Punta Gorda, Aug. 18, 1945, *L. O. Gaiser, Mrs. H. T. Butts & Miss L. Arnold* (F). Lee Co.: Marco, *A. S. Hitchcock*, 154 (G, NY, US). Collier Co.: golf course, Naples, Nov. 2, 1939, *Miss E. Scull* (F). Dade Co.: pinelands, s. of Miami R., Nov. 26, Dec. 20, 1913, *J. K. Small & G. K. Small*, 4791 (NY); between Miami & Kendall Sta., Nov. 5, 1906, *J. K. Small & J. J. Carter*, 2752 (NY); pinelands, s. of Miami R., Nov. 20, 1912, *J. K. Small*, 3858 & 3848 (NY); pinelands, Miami, Oct. 28–Nov. 28, 1903, *J. K. Small & J. J. Carter*, 534 (NY, P); between Cocoanut Grove & Cutler, Oct. 31, Nov. 4, 1903, *J. K. Small & J. J. Carter*, 1457 (NY); Cocoanut Grove, Nov. 2–5, 1901, *J. K. Small & G. V. Nash*, 184 (NY); pinelands, Cutler, Mar. 27, 1904, *N. L. Britton*, 287 (NY); Homestead, Sept. 16, 1927, *S. Hawkins* (F); pinelands, Big Pine Key, Dec. 2, 1912, *J. K. Small*, 3966 (NY); Pine Key, *J. L. Blodgett* (NY); Long Pine Key, Aug. 25, 1937, *Miss E. Scull* (F).

Nuttall (Gen. ii. 131 (1818)) described *L. tenuifolia* as having "leaves almost like those of *Pinus palustris* but flat and linear", and as being 2–4 feet tall with a long raceme of 1–2 feet (a photograph of his type at the British Museum, received through Mr. Weatherby, shows a stem about 6 feet tall). He gave the habitat as sandy forests of North and South Carolina. By comparison of specimens in the herbaria with this photograph of the type, this species does not seem to have been collected in North Carolina, but from South Carolina to Florida and westward through Alabama. Chapman (Fl. S. U. S. ed. 2, Suppl. 626 (1883)) described *L. tenuifolia* var. *quadriflora* from the banks of the Caloosa River, S. Florida, as having rigid, involute leaves and those of the upper stem setaceous.

In 1841, Nuttall (Trans. Amer. Phil. Soc. vii. 285 (1841)) described as a new species *Liatris laevigata*: "with almost filiform, subulate leaves; radical ones nearly a foot long, pungently acute and coriaceous". Examination of a photograph of the type specimen in the British Museum shows a plant only a little more than one foot high and with few basal broader leaves, that seems to include the concept of Chapman's var. *quadiflora*, and that is represented in the herbaria by specimens from along the Florida

coast to Big Pine Key. Although Nuttall referred to *L. tenuifolia* as being "everywhere smooth" and *L. laevigata* as "in every part very smooth", close study of the photograph of the former type shows some scattered cilia at the base of the leaves. Such a presence of cilia, in varying degrees, seems to be a constant accompaniment to the finely linear leaves of specimens from South Carolina, Georgia and Alabama. Plants wholly glabrous, having glossy, involute, almost quill-like leaves varying in width from 2 to 8 mm., are found only in peninsular Florida. It seems possible too that these latter may be more moisture-loving as they occur often in low pinelands and in flatwoods where the water level may be high.

Torrey & Gray (Fl. N. Am. ii. 70 (1841)) treated *L. laevigata* as a variety of *L. tenuifolia* and this was followed in Gray, Synop. Fl. i². 112 (1884), and in Proc. Amer. Acad. Sci. xlvii. 201 (1911), where Robinson described it as a conspicuously more robust variety and referred to specimens of Mr. G. V. Nash, no. 1669 and no. 2599, both from Eustis, Florida, as examples, and to that of Prof. Hitchcock, no. 154, also from Marco, Florida, as representing an intergradation between the more slender and more robust forms. The diameters of the corms of these three specimens, represented in three herbaria visited (G, NY, US), vary slightly, but all range between 18 and 38 mm. in diameter, thus coming well within the general measurements for *L. laevigata*. In collections from Florida there is evidence that the two types occur side by side as selections from the lists of specimens will show:

Manatee Co.: Bradentown, *S. M. Tracy*, 7100, ((G, US. resembles *laevigata*), (NY, T, resembles *tenuifolia*)); Franklin Co.: Apalachicola, *Biltmore Herb.* 4116a ((G, US, resembles *tenuifolia*), (NY, Q, resembles *laevigata*)); Duval Co.: Jacksonville, *A. H. Curtiss*, 1174 ((US 3074, resembles *laevigata*), (US 63073 & G, seem intermediate)).

Other specimens from Florida give evidence of intergradation between the two, as Robinson stated, in having leaves of intermediate width, or having some cilia at the base of the leaves, as well as showing intermediacy of stoutness of above- and below-ground stems. Some of these are listed below:

Without stated locality: *Chapman* (ex Herb. G. Thurber (G) & 449, 450 (US) & US 63076, US 968368); 1842–1844, *F. Rugel* (US). Manatee Co.: Manatee, *J. H. Simpson* (US). Duval

Co.: Jacksonville, Nov. 1891, *W. G. Farlow* (G); Jacksonville, Oct., *A. H. Curtiss*, 1174 (G). Dade Co.: Miami, Nov. 28, 1933, *F. Duckett*, 242 (G). Gulf Co.: St. Vincent Isl., Nov. 2, 1910, *W. L. McAtee*, 1810 (US). Volusia Co.: s. of New Smyrna, Oct. 14, 1944, *Mrs. H. T. Butts* (OA).

However, the great interest lies in the fact that all the intermediates come from Florida where both species have their greatest (and *L. laevigata* its exclusive) distribution. Mrs. H. T. Butts has collected from one location, south of New Smyrna, both *L. laevigata* and *tenuifolia* (including an albino specimen), as well as what has been here interpreted as an intermediate. Yet in the dry scrub of South Carolina or the sandy hills of Georgia the more slender *L. tenuifolia* alone seems to be represented. Thus because of the limitations in habitat of *L. laevigata* as well as the quite different appearance of leaf and plant, they are regarded as separate species that intergrade in Florida where their ranges overlap.

× Liatris Boykinii Torr. & Gray, emend. (*L. elegans* × *tenuifolia*). Stem nearly glabrous, slender, 3–6 dm. tall: leaves rather scattered, linear, lower elongated, upper short and setaceous: spike 1.5–2.5 dm. long, of rather crowded, subsessile or shortly pedicellate, 3–4-flowered heads; phyllaries glabrous, the outer ones short, lanceolate-subulate, the interior lanceolate or linear, with scarious margins and acuminate spreading summits, surpassing the flowers in length; flowers pale purple; corolla 9 mm. long, tube as well as filaments without any hairs; pappus 7 mm. long, plumose; achene ca. 4 mm. long, villous.—Fl. N. Amer. ii. 70 (1841).

GEORGIA. Muscogee Co.: near Columbus, *Dr. Boykin* (G, NY, type). Sumter Co.: along the high, sandy bank of Flint River, Sept. 10, 1900, *R. M. Harper*, 635 (NY, US).

L. Boykinii was described by Torrey & Gray from a plant collected near Coumbus, Georgia, by Dr. Boykin (G, NY). Later Gray (Synop. Fl. i^{1}. 110 (1884)) again included it, referring only to the single collection and stating: "not since found". Heads of this species were said to be larger than in *L. tenuifolia* and rather smaller than those of *L. secunda*. Small, Man. S. E. Fl. 1333 (1933), states: "perhaps a hybrid between *L. elegans* and *L. tenuifolia*". In 1900, R. M. Harper collected specimens, no. 635, along the high sandy bank of the Flint River, Sumter Co., Georgia (NY, US), with *L. elegans* and *L. tenuifolia*, noting on one sheet that the plants were intermediates between the two

species. Examination of these specimens shows the upper leaves very narrow and linear, quite like those of *L. tenuifolia*. The heads, 4-flowered, ca. 10 mm. long, have outer phyllaries that are narrowly lanceolate and inner ones with free spreading, pink, petaloid, prolonged tips suggesting the bracts of *L. elegans*. In numbers of flowers per head, in characters of corolla-tube, pappus and achene, the Harper collection bears a resemblance to Dr. Boykin's plant and it seems probable that these two collections from Georgia, where both *L. tenuifolia* and *L. elegans* occur, represent intermediates between the two species. During this investigation no other specimens have been found.

Series VI. Scariosae. Plants with stiff, robust stalks of the inflorescence bearing few to numerous large, campanulate, hemispheric or subglobose heads in loose open spikes or panicles; leaves mostly lanceolate, rarely oblanceolate; heads 15–70-flowered; phyllaries broad, orbicular, spatulate or obovate, mostly squarrose or bullate before the opening of the flowers; corolla-tube pilose within (except in *L. ligulistylis*); achene 3–7 mm. long. —From along the coast in New England, southward to Georgia, westward through Tennessee and Kentucky, to become widespread from Michigan and Wisconsin southward to Texas and Oklahoma and westward from the prairie provinces along the Rocky Mts. to New Mexico.

a. Heads short-cylindrical to globose....b.
  b. Heads subglobose, 25–50-flowered; phyllaries squarrose or bullate from before the time of opening of flowers (except in *L. scariosa* var. *virginiana*)....c.
    c. Phyllaries herbaceous, ciliolate, with only very narrow (if any) scarious margin, pubescent to rough; outer ones markedly and middle ones moderately squarrose; leaves and stem pubescent, basal leaves broadly obovate.....17. *L. scariosa.*
    c. Phyllaries thin, glabrous, broadly scarious, erose and colored, all markedly bullate; stem and leaves asperous or glabrous; leaves linear to linear-lanceolate.....18. *L. aspera.*
  b. Heads short-cylindrical to subglobose, 25–40-flowered; phyllaries mostly erect, appressed and herbaceous, never bullate and erose, though outer ones sometimes recurved.19. *L. scabra.*
a. Heads campanulate to hemispheric; phyllaries erect and loosely appressed through the maturing of the flowers....d.
  d. Heads hemispheric, 25–70-flowered....e.
    e. Leaves few, glabrous to densely pubescent but scabrous to the touch along the margin; basal leaves broadly lanceolate, reduced abruptly upwards to linear bracts; phyllaries broadly spatulate with deep scarious, erose and colored margins; inflorescence of few to 20 heads; corolla-tube non-pilose within.....20. *L. ligulistylis.*

e. Leaves numerous, glabrous or with but scattered pubescence on the lower surface and along the margin, often twisted, all linear-lanceolate; phyllaries oblong, herbaceous, hardly at all scarious but finely ciliolate on the margin; inflorescence of usually more than 20 heads . . . . . 21. *L. borealis.*

d. Heads campanulate, 15–25-flowered; leaves lanceolate, with upper ones sometimes linear, glabrous to asperous; phyllaries oblong to narrowly spatulate, mostly herbaceous and light green, with very narrow (if any) membranous margins, outer ones sometimes squarrose . . . . 22. *L. Earlei.*

17. Liatris scariosa (L.) Willd. Corm rounded, up to 5 cm. in diameter: stems one to several, usually with dense semi-appressed pubescence, 4–8 dm. high: leaves not numerous, from sparingly to densely pubescent, even to scabrous to the touch on both sides; basal leaves 0.8–1.5 dm. long, and 2–5 cm. wide, broadly oblanceolate, oblong to almost obovoid, narrowing to clasp the stem; upwards the bluntly oblanceolate leaves shortening through narrower ones 4–7 cm. long and 0.5–0.7 cm. wide, to bracts subtending the heads: inflorescence of 15–30 almost globular heads in an open raceme or occasionally panicle: heads 15–50-flowered, subglobose, 1.5–2.5 cm. in diameter, on short pedicels or occasionally longer ones forming a panicle-like inflorescence; phyllaries rather leathery and mostly recurved (except in var. *virginiana*), the outermost ones ovate and soon recurved, the middle and inner ones rounded at the tips, also somewhat recurved, mostly herbaceous, sometimes showing color, with a very narrow, thinner, ciliolate margin; corolla purple, pilose in the base of the tube, 7–11 mm. long; pappus 6–9 mm. long; achene 4–5 mm. long.—Spec. Pl. iii. 1635 (1803). *Serratula scariosa* Linn. Sp. Pl. ii. 818 (1753).

Mostly in the mountains from southern Pennsylvania to the border of South Carolina but one variety from the plains in the Carolinas, Georgia and Alabama.

Key to varieties

a. Phyllaries herbaceous, the outer ones soon recurved, the middle and inner ones somewhat recurved; basal leaves broadly obovate, the upper ones oblanceolate . . . . b.
  b. Heads of 25–50 flowers . . . . . var. *typica.*
  b. Heads of 15–25 flowers . . . . . var. *squarrulosa.*

a. Phyllaries mostly herbaceous or with narrow membranous margin, the outer ones but slightly if at all squarrose, middle and inner ones loosely erect; basal leaves broad- to long-lanceolate . . . . . var. *virginiana.*

Var. **typica.** Stem, leaves and phyllaries as described for the species: heads large, 25–50-flowered: corolla-tube 10–11 mm. long; pappus 8–9 mm. long; achene ca. 5 mm. long.—*Serratula scariosa* L. Sp. Pl. 818 (1753), sens. strict., with plant of Linnaean herbarium as type, not that of Gronovius.

In the Appalachian mountains from southern Pennsylvania through North Carolina.—PENNSYLVANIA. Co. undetermined: Mts. Alleghany, *Rafinesque* (P). Perry Co.: Upper Henry Valley, Sept. 5, 1920, *W. L. Abbott* (P). Franklin Co.: Mercersburg, *ex. Detwiler Herb.*, 17-1 (P); Blue Ridge Summit, 1886, *E. Tatnall* (G). Fulton Co.: McConnelsburg, Sept. 1907, *C. S. Williamson* (P), Sept. 1907, *E. B. Bartram*, collected by *W. S.* (NY); Tonolloway Creek, Sept. 20, 1870, *E. L. Tenbrook* (P). MARYLAND. Baltimore Co.: without stated locality, Aug. 1886, *G. L. S.*, 1176 (G). Alleghany Co.: Cumberland, Sept. 12, 1910, *J. E. Harned* (US, 648416, -17); mountainside, near Cumberland, Sept. 1934, *W. Rhoades* (G); s. of Cumberland, Sept. 8, 1926, *E. S. Steele*, 97 (G). VIRGINIA. Frederick Co.: shale near Dehaven, Sept. 15, 1940, *F. W. Hunnewell*, 16947 (G). Loudon Co.: opposite Point of Rocks, Sept. 12, 1935, *W. R. Maxon*, 10770 (US). Warren Co.: dry woods, near Bentonville, Sept. 7, 1938, *F. W. Hunnewell*, 15762 (G). Page Co.: vicinity of Blue Ridge, Stony Man Mt. near Luray, Sept. 2, 1901, *E. S. & Mrs. Steele*, 224 (US, 418571). Fairfax Co.: Difficult Run, Sept. 29, 1904, *W. Palmer* (US), Sept. 18, 1899, *E. S. Steele* (US); pike near Difficult Run, Sept. 30, 1911, *E. S. Steele* (G); pike near Difficult Run, Oct. 6, 1907, *E. S. Steele* (G, US); near mouth of Difficult Run, Sept. 25, 1909, *F. W. Pennell* (US); pike near Difficult Run, Great Falls, Oct. 2, 1910, *F. W. Pennell* (US). Shenandoah Co.: Massanutten Mts., s. end of Short Mt., steep dry shales near roadside, Aug. 19, 1938, *H. A. Allard*, 5466 (G); low hills, s. of hotel, vicinity of Orkney Springs, alt. 450 m., Sept. 11, 1911, *E. S. Steele*, 121 (US, 1521106); low hills s. of hotel, vicinity of Orkney Springs, alt. 480 m., Sept. 11, 1911, *E. S. Steele*, 126 (G); 127 (US); on true shale barrens, at foot of Pugh's Run, n. of Woodstock, Massanutten Mt., Sept. 22, 1940, *H. A. Allard*, 8228 (G). Highland Co.: shale barrens, Shenandoah Mt., Staunton-Monterey Road, Sept. 9, 1934, *Miss E. S. Rawlinson* 269 (US). Bland Co.: East River Mt., in rocky places, Sept. 1, 1931, *E. L. Core*, 6841 (NY). Rappahannock Co.: 6 mis. w. of Sperryville, Sept. 21, 1905, *Mrs. E. P. Miller* (US590496, -7). WEST VIRGINIA. Morgan Co.: Largent, Aug. 25, 1933, *E. J. Alexander, T. H. Everett, S. D. Pearson* (NY). Hampshire Co.: dry sandy woods, Cold Spring Gap, North Mt., Sept. 6, 1936, *F. W. Hunnewell*, 14430 (G). Hardy Co.: Bean Settlements, Sept. 27, 1930, *W. M. Sharp* (G). Greenbrier Co.: White Sulphur Springs, Sept. 7, 1906, *E. S. Steele* (US 494223). NORTH CAROLINA. Durham Co.: open rocky ground, near Eno R., *H. L. Blomquist*, 10518 (P); edge of ditch, Duke Forest, Oct. 1, 1932, *H. L. Blomquist*, 439 (US).

Var. SQUARRULOSA (Michx.) Gray. Differing from var. *typica* in slenderer habit, with leaves and heads smaller: heads 15–25-flowered, ca. 1 cm. high and 1–1.5 cm. thick when the flowers are open; corolla-tube ca. 7 mm. long; pappus 5–6 mm. long; mature achene 4 mm. long.—Synopt. Fl. i². 110 (1884). *L. squarrulosa* Michx. Fl. Bor.-Am. ii. 92 (1803); Shinners, Am. Midl. Nat. xxix. 33 (1943). *Laciniaria scariosa* var. *squarrulosa* Small & Vail. Mem. Torr. Bot. Club, iv. 28 (1894), in part.

Piedmont and Coastal plain of N. and S. Carolina, Georgia and Alabama.—NORTH CAROLINA. DURHAM Co.: Pont Rock, Aug., 1896, *C. S. Williamson* (P); open, rocky ground, north of Eno R., old Oxford Road, from Durham, Sept. 24, 1928, *H. L. Blomquist*, 10578 (F, P). SOUTH CAROLINA. BERKELEY Co.: dry, rich soil, Santee Canal, *H. W. Ravenel*, 3 collections with slightly differing data (G). AIKEN Co.: Aiken, *Ravenel* (NY). GEORGIA. WILKES Co.: without locality, 1833, *Herb. J. A. Lowell* (G). MCDUFFIE Co.: pine-barrens, vicinity of Thomson, Oct. 10, 1910, *H. H. Bartlett* 2420 (G, US). RICHMOND Co.: dry barrens, Aug. 1876, and oak woods near pool, Oct. 10, 1898, Augusta, *A. Cuthbert* (F). JEFFERSON Co.: without locality, Sept. 25, 1897, *H. Hopkins* 40, 41 (NY). ALABAMA. MARSHALL Co.: rocky woodland, Albertsville, Oct. 9, 1900, *Biltmore Herb.* 2670a (US).

Var. **virginiana** (Lunell) comb. nov.—Similar in size, habit and floret-characters to var. *typica* but differing in the somewhat reduced more lanceolate leaves and the mostly erect membranous-margined phyllaries: basal leaves broadly lanceolate, 7–12 cm. long, 2–3 cm. wide, narrowed to a winged petiole of about one third the length of the blade, upper ones gradually shortened and non-petiolate; heads 20–30-flowered (sometimes up to 50), ca. 1.5 cm. tall and wide, turbinate to hemispherical by reason of the erect phyllaries; outer phyllaries short, ovate, herbaceous with fine ciliolate margin, sometimes slightly recurved: middle ones longer, loosely erect, herbaceous and ciliolate-margined for the most part but with rounded tips, narrowly erose and usually purplish.—*Laciniaria scariosa* var. *virginiana* Lunell, Amer. Mid. Nat. ii. 172 (1912). *Laciniaria scariosa* var. *borealis* Lunell, ibid 264, probably Cirsium non ramosum . . . flores ferens pauciores majores . . . of Gron. Virg. i. 92 (1739).

Mostly in the mountains from southern Pennsylvania to South Carolina.—PENNSYLVANIA. CENTRE Co.: without stated locality, Sept. 5, 1868, *J. T. Rothrock* (G). LEHIGH Co.: on roadside embankment at edge of woods, 1 mi. s. w. of Schnecksville, Sept. 30, 1917, *J. W. Pretz*, 9171 (US). HUNTINGTON Co.: dry wooded shaley hillside, 2 mis. n. w. of Petersburg, Sept. 21, 1941, *H. A. Wahl*, 1163 (G). CHESTER Co.: without stated locality, Aug. 1858–64, *S. P. Sharples* (G). BEDFORD Co.:

wood road, 1½ mis. n. w. of Breezewood, alt. 1060′, Aug. 3, 1940, *D. Berkheimer*, 2178 (G). MARYLAND. ALLEGHANY Co.: Cumberland, Sept. 12, 1910, *J. E. Harned* (US 648418). GARRETT Co.: Mountain Lake Park, Sept. 2, 1906, *J. J. Carter* (NY), Aug. 30, 1906, *C. D. Lippincott* (NY), Aug. 26, 1928, *E. S. Steele*, 3 (US 14860-45, -49); vicinity of Oakland, Mountain Lake Park, *E. S. Steele*, Sept. 4, 1910 (No. 84 US 64857-1, -2), Sept. 7, 1910 (No. 60 US 648566), Sept. 7, 1910 (No. 21 US 6485-61 to -70 excluding -66), Sept. 16, 1910 (No. 61 US 64857-3, -4); scrubby ground toward Deer Park, Aug. 25, 1921, *E. S. Steele*, 150 (G); low open ground, Rwy. e. of Mountain Lake Park, Aug. 9, 1921, *E. S. Steele*, 118 (G). WEST VIRGINIA. PRESTON Co.: grassy ground n. of Lake, Terra Alta, Sept. 4, 1920, *E. S. Steele*, 299 (US 1117671); flat ground n. of lake, Terra Alta, Aug. 31, 1923, *E. S. Steele*, 166 (US 128604-1, -2); n. side of lake e. of camp, vicinity of Terra Alta, Aug. 18, 1924, *E. S. Steele* (US 1326616); near camp n. of lake, vicinity of Terra Alta, Sept. 11, 1924, *E. S. Steele*, 114 (US 13263-39, -40); roadside toward quarry, Terra Alta, Sept. 9, 1925, *E. S. Steele*, 78 (G, US 148603-6, -7, -8, -9, -40, -43, -44); Boys' Camp n. of lake, vicinity of Terra Alta, Aug. 26, 1926, *E. S. Steele*, 68 (G). TUCKER Co.: Canaan Valley, *W. V. U. Biol. Exped.* (G). GREENBRIER Co.: White Sulphur Springs, Aug. 27, 1903, *K. K. Mackenzie* 363 ((I. type), NY, US, (G, without no.)); mt. north of Springs (alt. 2000′–3000′), White Sulphur Springs, Sept. 7, 1906, *E. S. Steele* (G, US); Kate's Mt., White Sulphur Springs, Sept. 4, 1920, *Miss M. S. Franklin* (G). MONROE Co.: Peter's Mt., Aug. 31, 1903, *E. S. Steele & Mrs. Steele* (US, 490324); vicinity of Old Sweet Springs, *E. S. Steele*, Sept. 11, 1903 (US 648302), Sept. 9, 1905 (US, 590189), Sept. 2, 1905 (US, 590187); ridge of Peter's Mt., on State line, Sept. 12, 1905, *E. S. Steele* (G, US, 590190); Peter's Mt., vicinity of Old Sweet Springs on Va. & W. Va. line, Sept. 11, 1903, *E. S. Steele* (G, US 63531). VIRGINIA: WARREN Co.: Little Passage Creek, Sept. 21, 1897, *G. S. Miller* (US). PAGE Co.: Stony Man Mt., Aug. 11, 1901, *W. Palmer*, 61 (US); crevices of rocks, Stony Man Mt., Aug. 18, 1901, *W. Palmer & W. H. King*, 61 (US); exposed cliffs, Stony Man Mt., near Luray, Aug. 31, 1901, *E. S. Steele & Mrs. Steele*, 224 (G, NY, US); vicinity of Blue Ridge, Stony Man Mt., near Luray, Sept. 2, 1901, *E. S. Steele & Mrs. Steele* 224 (G, NY); near Luray, Sept. 18, 1905, *G. S. Miller* (US). SHENANDOAH Co.: brushy slope, Great North Mt., vicinity of Orkney Springs, Sept. 4, 1911, *E. S. Steele*, 64 (G), 62 (G, US); Great North Mountain, vicinity of Orkney Springs, Sept. 14, 1911, *E. S. Steele*, 141 (G (US, 1520733)); low hills s. of hotel, vicinity of Orkney Springs, Sept. 5, 1911, *E. S. Steele*, 74 (G); vicinity of Orkney Springs, Sept. 4, 1911, *E. S. Steele*, 69 (US 609901-2); on red sandstone barrens, on top of Great North Mt., Sept. 19, 1937,

H. A. Allard, 3765 (G). Bath Co.: sandstone soil, Mill Mt., vicinity of Millboro, Aug. 20, 1906, *E. S. Steele* (G); vicinity of Millboro (alt. 485 m.), *E. S. Steele*, Sept. 3, 1906 (G, US 648421), Sept. 11, 1906 (G, US 494573); on shale in vicinity of Millboro, Sept. 3, 1906, *E. S. Steele* (US, 494572, 648301). Rockbridge Co.: Mill Mt., vicinity of Millboro, Sept. 16, 1907, *E. S. Steele* (US, 494571). Craig Co.: s. of Peter's Mt., vicinity of Orkney Springs, Sept. 12, 1905, *E. S. Steele* (US, 590188); Peter's Mt., Sept. 1, 1903, *E. S. Steele & Mrs. Steele* (G, NY). NORTH CAROLINA. Yancey Co.: Wayah Bald Summit, Sept. 11, 1933, *E. J. Alexander, T. H. Everett & S. D. Pearson* (NY). Buncombe Co.: vicinity of Montreat, Sept. 9, 1913, *P. C. Standley & H. C. Bolm* (US, 10499, 10501-02, -11, -12, -13, -14). Haywood Co.: on slopes of Pine Mt., vicinity of Eagle's Nest, Sept. 6, 1910, *P. C. Standley*, 5552 (G, US); near Waynesville, near Highlands, *Biltmore Herb.*, 2670v (US, 957890). Swain Co.: Great Smoky Mts., Aug. 28, 1891, *E. C. Beardslee & C. A. Kofoid* (G). Macon Co.: below Satula Mt., (alt. 2500′) Highlands, Sept. 2, 1902, *E. E. Magee* (G). SOUTH CAROLINA. Oconee Co.: summit of Thomas Bald Mt., near Georgia border (alt. 5200′), Aug. 19, 1893, *J. K. Small* (NY); eastern base of Tomassee Knob (alt. 1200′), Sept. 14, 1938, *R. T. Clausen & H. Trapido*, 3620 (NY).

No species of *Liatris* has been so misunderstood and become the "catch-all" for as many different entities as *Liatris scariosa*. When describing *Serratula scariosa*, Linnaeus cited Gronovius (Gron. Virg. 92 (1739)), who described a plant observed and collected in Virginia by Clayton as follows: "Cirsium non ramosum foliis lateralibus flores ferens pauciores majores squamis hiantibus armatos pediculis curtis insidentibus, radice etiam tuberosa". The further references to descriptions by Banister (Plant. Virg. Ban. 1929 (1693)) and Plukenet (Pluk. Mant. 105 (1749)) do not clearly identify the species, nor does the figure of Plukenet (Pluk. Phyto. t. 177 f. 4 (1696)) accompanying a description (Pluk. Alm. 142 (1696)) that includes the phrase "floribus scariosis".

Linnaeus added to the description "calycibus squarrosis pedunculatis obtusis lateralibus" and, in the final note pointing out differences from *Serratula squarrosa*, he again referred to the same character: "calycibus squarrosis obtusis". The distinctive squarrose phyllaries point to a character from which many of the determinations of *Liatris scariosa* have varied.

There is in the Linnaean herbarium a specimen labelled *scari-*

osa which Linnaeus had at the time of writing his description, a photograph of which Professor Fernald kindly allowed me to see. Though not a complete plant (the tip of the inflorescence and the base of the plant being lacking) this shows twelve large heads ca. 1.5 cm. in diameter borne at the ends of pedicels about 3 cm. long, and the phyllaries are squarrose. The outermost ones are distinctly reflexed against the pedicels and the middle and inner ones to a slighter degree. All appear quite herbaceous and not at all scarious but rather slightly ciliolate on the margin. The leaves just below the lowest heads are oblanceolate, about 5 cm. long and 1.5 cm. wide, narrowing from the middle to a clasping base. Though the basal leaves are wanting on the specimen they would undoubtedly have been quite wide since a width of 1.5 cm. for an upper cauline leaf of *Liatris* is large. By use of a lens the rachis and leaves are seen to be pubescent.

Willdenow (Sp. Pl. iii. 1635 (1803)), when transferring this species to the genus *Liatris*, again emphasized the obovate squarrose phyllaries and added to the description of the inflorescence, a terminal leafy raceme, and to that of the leaves "utrinque attenuatis margine scabris". It is noteworthy that no mention of "scarious" phyllaries was made by any of the authors except Plukenet, whose phrase "floribus scariosis" is thus probably to blame for the name. Dr. H. K. Svenson,[1] who examined the Willdenow specimen and made drawings and notes, states: "bracts not particularly scarious, the scarious character perhaps referring to the fringe of hairs".

Though I have not seen the Clayton plant nor a photograph of it, there is in the National Herbarium a tracing of it, accompanying some correspondence by E. G. Baker in connection with determinations of specimens sent to him. When commenting on the plant from the Herb. Gronovius (British Museum Herb.) he noted: "(a) the bracts of the involucre are ciliate on the margin. (b) the bracts in the type are straight not folded. (c) the bracts do not tend to enlarge near the summit". The tracing shows 12 heads, almost hemispherical with the phyllaries erect, not reflexed, and the upper stem-leaves quite as wide as those in Linnaeus's plant. Thus, though the Gronovian plant does not perfectly match the Linnaean one and we are omitting it from the synony-

[1] Private communication.

my of *L. scariosa* var. *typica*, we believe it may represent what occurs abundantly in the mountains of Pennsylvania, Maryland, West Virginia and Virginia. Specimens from there have been examined that show the outer phyllaries to be herbaceous and spreading or but slightly reflexed, with the middle and inner ones a little scarious on the margin, less leathery than in *typica*, often colorful and also erect. The leaves vary from glabrous to asperous with basal ones very broad- to longer-oblanceolate and petiolate. Lunell described a plant from West Virginia, Aug. 27, 1903, *K. K. Mackenzie*, no. 363, White Sulphur Springs (I), as *Laciniaria scariosa* var. *virginiana* (Amer. Mid. Nat. ii. 172 (1912)), which he later renamed var. *borealis*, ibid. 264. It would seem to represent such a derivative. That there are slight variations in leaf- and especially in phyllary-characters can be seen by comparing the three specimens of the same date and number of the collector (I, NY, US), and a fourth (G) which has no number. While the type at the University of Indiana Herbarium has phyllaries quite ciliolate on the margins, the specimens at the National and Gray Herbaria have them hardly at all so, though in all three the phyllaries are erect. The specimen at the New York Botanical Garden, with rougher leaves and spreading phyllaries with only narrowly scarious, ciliolate margins, comes nearer *L. scariosa* var. *typica*. While other specimens have been seen that represent variations which perhaps may be combinations of parental characters of *L. scariosa* var. *typica* and *L. aspera* var. *glabra*, both of which occur in that range, there is nevertheless sufficient constancy found in these specimens of Mackenzie's to recognize their individuality and to relate them to *L. scariosa*. We have therefore retained Lunell's first varietal name and refer them to *Liatris scariosa* (L.) Willd. var. *virginiana* Lunell.

Michaux (Fl. Bor.-Amer. ii. 92 (1803)) described a species from South Carolina with lanceolate leaves, rough on the margin, and with outer phyllaries squarrose, calling it *Liatris squarrulosa* and in a note following the Latin description he stated that it seemed to be like *Serratula scariosa* but he wondered why, as Plukenet held, it should be called *scariosa*. From photographs of Michaux's type specimen and of a duplicate and rather better specimen, obtained by Mr. Weatherby, it seems to have been a

less robust, slender variety of the same species that is shown in the photograph of the Linnaean type. The heads are slightly smaller and the phyllaries more elongate than rounded but they are obtuse. The basal leaves are broadly, and the upper ones narrowly oblanceolate so that the whole plant strongly resembles the Linnaean one and we have no hesitancy in accepting its reduction to varietal ranking by Gray (Synopt. Fl. i^2. 110 (1884)) as *Liatris scariosa* var. *squarrulosa*. However, we do not accept the appended synonymy of *L. heterophylla* R. Br. (Ait. Hort. Kew. ed. 2, iv. 503 (1812)) which was described as having acute, lanceolate phyllaries. A photograph of that type specimen from the British Museum, a plant cultivated by Mr. William Malcolm, shows a plant with a very different involucre. Most striking are the long, pointed phyllaries. From a packet at the Gray Herbarium, containing the phyllaries of a fragmentary head of this specimen, from the Banks Herbarium, they were found to be very thin and glabrous as well as linear. Pursh (Fl. ii. 508 (1814)) when including a description of the species, after having seen the specimen, stated that the flowers were of the size of *L. graminifolia*, and he cited *L. varia* Herb. Banks ms. in synonymy. At the bottom of the sheet of *L. heterophylla* (Banks) there can be seen faintly written "*L. varia*" which undoubtedly explains this reference. When Torrey & Gray (Fl. ii. 75 (1841)) described the species by use of the then recently received head and additional notes supplied by Mr. Bennett, they concluded that, though resembling *L. scariosa* in size and shape of heads, it did not match even depauperate specimens of that species because of the pointed scales. As in the time of those writers, "apparently the species has not been subsequently met with in this country", and we leave it among the doubtful species.

18. Liatris aspera Michx. Corm rounded, irregular, subglobose, 2–5 cm. in diameter: stems frequently single, sometimes several, quite stout, 4–11 dm. high, glabrous below with scattered hairs above on the rachis of the flowering spike, to asperous over the entire stem-length; leaves mostly linear-lanceolate though frequently almost linear; the basal broader, 1–1.5 dm. long, 1–2 cm. wide, rhombic-lanceolate, narrowed into petioles of about half the total length, glabrous on both surfaces and lacking any marginal roughness, or asperous on one or both surfaces; upper leaves sessile, reduced to less than the length of the heads they

subtend: inflorescence a long open spike of usually more than 20 sessile to pedunculate somewhat globose, 25–40-flowered, heads 1.5–2.5 cm. in diameter; phyllaries all glabrous with exposed tips rounded and with broad scarious margins, and slightly bullate, middle and inner ones oblong-spatulate, to rounded and strongly bullate, giving the globose head a puckered appearance; corolla usually purple, rarely white, pilose within the tube at the base of the stamens, tube 8–10 mm. long; pappus 7–8 mm. long; achene 4–6 mm. long.—Fl. Bor.-Amer. ii. 92 (1803); Ell. Sk. ii. 276 (1822(?)); DC. Prodr. v. 130 (1836). *L. scariosa* sensu Sims, Curtis's Bot. Mag. t. 1709 (1815) not (L.) Willd. *L. sphaeroidea* sensu Sweet Br. Fl. Gard. 1 ser., t. 87 (1824); Shinners, Amer. Mid. Nat. xxix. 34 (1943), not Michx. *Laciniaria aspera* Greene, Pittonia, iv. 318 (1901). *Liatris scariosa* Willd. f. *Benkii* Macb., Field Mus. Pub. Bot. iv. 127 (1927). *Liatris sphaeroidea* f. *Benkii* (Macb.) Shinners, Amer. Mid. Nat. xxix. 35 (1933).

Var. **typica.** Stem rough-puberulent above or throughout with appressed or more or less incurved hairs: leaves asperous with dense, short, stiff hairs, linear-lanceolate, generally narrowly so.—*Liatris aspera* Michx. sens. strict. *Laciniaria scariosa* (L.) Hill vars. *porrecta* and *obesa* Lunell, Amer. Midl. Nat. ii. 159–162 (1912). *L. scariosa* vars. *virgata*, *strictissima* and *salutans* Lunell, Amer. Midl. Nat. ii. 169–177 (1912). *Liatris sphaeroidea* var. *salutans* (Lunell) Shinners, Amer. Midl. Nat. xxix. 37 (1943). *Liatris sphaeroidea* forma *asperifolia* Shinners, Amer. Midl. Nat. xxix. 36 (1943). *Lacinaria indecidua* and *Lacinaria stratiotes* Steele ex Winter, Analysis Flowering Plants of Nebraska, 143 (1936), Contrib. Bot. Surv. Neb. n. s. x. 143 (1936).

Central States from Ohio, Wisconsin, Minnesota and North Dakota southward to Louisiana, Oklahoma and Texas.—OHIO. Lucas Co.: n. of Monclova, Aug. 8, 1924, *Miss B. Garber* (US). Scioto Co.: Friendship, Shawnee State Forest, *D. Demaree*, 11139 (NY). INDIANA. Porter Co.: on the dunes, Dune Park, Sept. 17, 1909, *E. S. Steele*, 163a (G). Jasper Co.: open sandy places, Sept. 13, 1942, *C. M. Ek* (F). WISCONSIN. Co. undetermined: St. Helena, Aug. 1881, *T. H. Bradwin* (G). Oneida Co.: Manson, Sept. 1935, *B. O. Dodge* (NY). Polk Co.: dry ground, Rwy. right of way, St. Croix Falls, Sept. 4, 1927, *N. C. Fassett & L. R. Wilson*, 5453 (G). Brown Co.: Preble (plant to left), Aug. 21, 1878, *J. H. Schuette* (G). Pepin Co.: open dunes, lower terrace (albino), Aug. 27, 1927, *N. C. Fassett*, 4482 (G). Juneau Co.: abandoned field, 2 mis. s. of Matha, Aug. 27, 1937, *J. W. Thomson* (NY). Sauk Co.: on the cliffs, on the s. side of Devil's Lake, Aug. 30, 1909, *E. S. Steele*, 80 (G). Waukesha Co.: Nashotah, Aug. 24, 1884, *R. N. Larrabee* (G). Grant Co.: Boscobel prairies (one plant), July 1886, *C. H. Sylvester* (NY). Racine Co.: prairies, Sept. 8, 1882, *H. E. Hasse* (NY). Rock

Co.: Clinton, along the Chicago & N. W. Rwy., Sept. 1, 1909, *E. S. Steele*, 96c (G), 96a (NY), 96b (US, 608836). MINNESOTA. Pine Co.: in sand at edge of forest, Highway 61, near Willow R., Aug. 10, 1938, *Miss O. Lakela*, 2726 (G). Todd Co.: dry sandy ground, Staples, Aug. 6, 1910, *Z. L. Chandonnet* (G); Staples, *Z. L. Chandonnet*, Aug. 18, 1914 (no. 307) (US), Aug. 9, 1911 (no. 4) (M, type of *Laciniaria scariosa* var. *porrecta* Lunell); (no. 1) (M, type of *Laciniaria scariosa* var. *obesa* Lunell). Chisago Co.: Center City, July 1892, *B. C. Taylor* (G, plant 1). Stearn Co.: St. Anthony, July 22, 1888, *J. H. Schuette* (NY). Hennepin Co.: Fort Snelling, Sept. 1888, *E. A. Mearns*, 141 (US); prairies, Fort Snelling Reservation, Sept. 21, 1907, *C. O. Rosendahl*, 2066 (G); Richfield, Sept. 1875, *N. H. Winchell* (NY). Wabasha Co.: sand prairie, about 2 mis. n. of Weaver, Sept. 28, 1930, *N. Hotchkiss & P. Jones* 4171 (US). Goodhue Co.: Vasa, Aug. 1893, *A. P. Anderson* (US). Lincoln Co.: Verdi, Aug. 1891, *E. P. Sheldon*, S1344 (M). ILLINOIS. Without stated locality: July, 1846, *S. B. Mead* (G). McHenry Co.: Ringwood, *G. Vasey* (G). Winnebago Co.: Fountaindale, *M. S. Bebb* (G, 281 US). Jo Daviess Co.: Hanover, Aug. 18, 1908, *H. A. Gleason* (G). Cook Co.: Riverside, Aug. 1912, *J. M. Greenman*, 3831 (G); prairies, near Chicago City, Sept. 9–12, 1892, *Ohlendorf* (NY); vicinity of Chicago, Aug. 1909, *Miss Reynolds*, 2783 (NY, US). Peoria Co.: dry sandy ground, Peoria, Aug. 1904, *F. E. Macdonald* (M, type of *Laciniaria scariosa* var. *strictissima* Lunell); dry sandy soil, Peoria, Aug. 1904, *F. E. Macdonald*, 1904 (G, NY); gravelly soil, Peoria, Sept. 3, 1908, *F. E. Macdonald* (G). McLean Co.: prairieland, Hendrix, Aug. 31, 1904, *B. L. Robinson* (G). Champaign Co.: Champaign, by I. C. Rwy., Sept. 11, 1909, *A. S. Pease*, 12397 (G); Urbana, Sept. 25, 1900, *Miss M. L. Sheldon* (G); original prairies, Rantoul, Oct. 5, 1907, *F. C. Gates*, 2043 (US). Mason Co.: Topeka, Aug. 22, 1904, *H. A. Gleason* (G); Decatur, Sept. 1, 1939, *R. G. Mills* (NY). Morgan Co.: vicinity of Concord, 2 mis. s. of Chapin, Sept. 1916, *Miss S. Pratt* (US). Pike Co.: Rockport, Aug. 1904, *J. F. Clevenger* (US). IOWA. Emmett Co.: Armstrong, Aug. 1890, *R. I. Cratty* (G); prairie, slope of Four Mile Creek, 3 mis. w. of Estherville, Aug. 13, 1934, *Miss A. Hayden*, 10535 (NY). Fayette Co.: prairies, Sept. 1894, *B. Fink* (G). Cherokee Co.: upland prairie slopes, 3 mis. s. of Cherokee, Sept. 5, 1937, *Miss A. Hayden*, 10537 (NY). Hamilton Co.: dry prairie, along C. & N. W. Rwy., 2 mis. w. of Webster City, Sept. 13, 1933, *Miss A. Hayden*, 413 (NY). Carroll Co.: Carroll, Aug. 29, 1896, *L. H. Pammel*, 38 (G, NY). Johnson Co.: prairies, Sept. 3, 1895, *M. F. Fitzpatrick* (I, type of *Laciniaria scariosa* var. *virgata* Lunell); Coralville, Sept. 3, 1909, *M. P. Somes* (US). Poweshiek Co.: Grinnell, 1875, *M. E. Jones* (G, NY), Aug.–Sept.

1907, *Miss R. Drew* (G, NY, US 494671). Dallas Co.: Redfield, Sept. 5, 1867, *J. A. Allen* (G). MISSOURI. Co. undetermined: prairies, Sept. 1838, *N. Riehl*, 10 (NY). Atchison Co.: dry ground, Oct. 1893, *B. F. Bush*, 199 (NY). Adair Co.: Kirksville, Sept. 5, 1883, *C. S. Sheldon*, 3505 (NY). Macon Co.: Ethel, Sept. 22, 1915, *B. F. Bush*, 7802 (US). Jackson Co.: dry prairies, Martin City, Sept. 18, 1901, *K. K. Mackenzie*, 469 (NY, US); barrens, Dodson, Oct. 4, 1906, *B. F. Bush*, 4155 (G), 4159 (US); Dodson, Aug. 26, 1895, *B. F. Bush*, 242 (NY), Sept. 27, 1915, *W. W. Eggleston*, 12046 (NY); Sheffield, Sept. 6, 1896, *B. F. Bush*, 909 (US); prairies, Lee's Summit, Sept. 5, 1906, *B. F. Bush*, 4098 (G), 4097 (US). St. Louis Co.: Allenton, Aug. 30, 1894, *G. W. Letterman* (NY, US). Johnson Co.: near Warrensburg, Nov. 5, 1916, *G. W. Stevens*, 4424 (NY). Barton Co.: dry prairies, Golden City, Oct. 7, 1913, *E. J. Palmer*, 4593 (US). Greene Co.: vicinity of Springfield, *P. C. Standley*, Aug. 21, 1912 (no. 9172) (US), Aug. 31, 1911 (no. 8569) (G, US), Aug. 1906 (US). Barry Co.: Hailey, *J. W. Phillips* (G; US, Sept. 15, 1915). ARKANSAS. Benton Co.: without stated locality, 1899, *E. N. Plank* (NY). NORTH DAKOTA. Richland Co.: Hankinson, Aug. 25, 1902, *P. A. Rydberg*, 1151 (NY). SOUTH DAKOTA. Roberts Co.: hillsides, Aug. 1922, *W. H. Over*, 14357 (US). Marshall Co.:[1] mouth of St. Peter's River, Sept. 19, 1839, *C. A. Geyer*, Nicollet's N. W. Exped., 271 (US). Grant Co.: virgin prairie, Clear Lake near Big Stone Lake, Aug. 1, 1940, *P. Johnson*, 69 (NY). Spink Co.: Doland, Sept. 10, 1896, *L. W. Carter* (NY). Brookings Co.: Lake Hendricks, Aug. 1906, *Miss F. N. Vasey* (G, US). Yankton Co.: high knolls, Jamesville, Aug. 24, 1899, *L. A. Bruce*, 55 (US). NEBRASKA. Co. undetermined: prairies, Sept. 16, 1874, *O. Kuntze*, 2923 (NY). Antelope Co.: Brunswick, Sept. 5, 1908, *N. F. Peterson* (US). Saunders Co.: Mead's Ranch, Aug. 24, 1893, *F. Clements*, 2901 (G (US, type of *Lacinaria indecidua* Steele) N). Howard Co.: St. Paul, Aug. 29, 1919, *J. M. Bates* (G). Cass Co.: Weeping Water, Aug., *T. A. Williams* (US, 517526). Lancaster Co.: Lincoln, 1906, *C. E. Bessey* (US), Aug. 1886, *H. J. Webber* (NY); Lancaster, Sept. 10, 1873, *S. Angley* (N, type of *Lacinaria stratiotes* Steele). Saline Co.: Crete, *C. E. Brown* (US). Kearney Co.: Minden, Aug. 26, 1917, *Dr. H. Hapeman* (G). KANSAS. Co. undetermined: from Council Grove to Fort Leavenworth, Aug. 1847, *Plant. Nov. Mex., A. Fendler*, 302 (333)[2] (G). Riley Co.: prairie, Sept. 12, 1895, *J. B.*

[1] From Senate Report intended to illustrate a map of the Hydrographical Basin of the upper Mississippi River made by I. N. Nicollet, Feb. 16, 1841, Washington 1843, the place of this collection would seem to be about Marshall Co. just a little north of Day Co.

[2] In Plant. Fendl. A. Gray, 1849, page 63. specimen no. 302 is listed as *L. scariosa* Willd. and was collected from "Council Grove to Fort Leavenworth", Aug. 1847. The

Norton, 214 (G, US, NY); Manhattan, Sept. 12, 1892, *J. B. Norton* (NY). DOUGLAS Co.: Lawrence, *W. C. Stevens* (US). SHAWNEE Co.: Topeka, Summer, 1897, *Prof. Harshberger*, 3469 (US). LYON Co.: high prairies, 3 mis. n. of Madison, Sept. 18, 1941, *H. A. Stephens* (G). LINN Co.: grassy hillside, near Parker, Oct. 21, 1916, *G. W. Stevens*, 4341 (NY). COWLEY Co.: without stated locality, Aug. 22, 1898, *M. White* (NY). OKLAHOMA. OTTAWA Co.: in dry pasture, Ottawa, Aug. 29, 1913, *G. W. Stevens*, 2511 (G). NOWATA Co.: grassy roadside, Lenapah, Aug. 19, 1913, *G. W. Stevens*, 2176 (G). ROGERS Co.: 4 mis. n. of Catale, Oct. 9, 1938, *M. Hopkins & M. Van Valkenburgh*, 3678 (O). TULSA Co.: without stated locality, Autumn, 1926, *E. R. Force*, 13026 (O); dry railroad side, n. e. of Tulsa, Sept. 17, 1939, *U. T. Waterfall*, 1797 (O). PAYNE Co.: 6 mis. n. of Stillwater, Sept. 13, 1935, *E. E. Richardson* (O). MUSKOGEE Co.: Lot 4, Sept. 4, 1927, *E. L. Little*, 2227 (O). TEXAS. BASTROP Co.: Bastrop, NOV. 24, 1928, *B. C. Tharp* (NY), Oct. 1926, *H. H. Duval* (US). WALKER Co.: 14 mis. s. w. of Huntsville, Sept. 28, 1934, *V. L. Cory*, 10260 (G). HARRIS Co.: sandy soil near Houston, Aug. 21, 1903, *Biltmore Herb.* 2670e (US); Houston, Sept. 28, 1917, *E. J. Palmer*, 12786 (US); near Houston, Sept. 22, 1903, *Biltmore Herb.*, 2670j ((I, type of *Laciniaria scariosa* var. *salutans* Lunell) (US)); Houston, *G. L. Fisher*, Sept. 24, 1937 (no. 37160) (US), Aug. 23, 1915 (no. 1513) (US), Aug. 23, 1914 (no. 2032) (US), 1842, *F. Lindheimer* (G). GONZALES Co.: Cottonwood Springs, Sept. 7, 1933, *H. B. Parks*, 7682 (G).

Var. **intermedia** (Lunell), comb. nov. Stem glabrous below, with appressed hairs above on the rachis of the flowering spike; leaves glabrous or with but a few scattered hairs and frequently broadly lanceolate.—*Laciniaria scariosa* (L.) Hill var. *intermedia* Lunell, Amer. Mid. Nat. ii. 173, 177 (1912) = var. *media* Lunell ibid. 264 (1912). *Laciniaria scariosa* var. *petiolata* Lunell, Amer. Mid. Nat. ii. 172, 176 (1912). *Liatris sphaeroidea* of many authors, not Michx. Fl. Bor.-Amer. ii. 92 (1803). Probably *L. sphaeroidea* sensu Lodd. Bot. Cab. t. 1417 (1828), though description insufficient.

Occurring east of the Mississippi through North and South Carolina to Georgia and Florida, from Ontario through Indiana and Kentucky to Alabama and west of the Mississippi more generally in the southern central plains-states, Missouri, Arkansas, Louisiana, Texas and Oklahoma.—WEST VIRGINIA. RITCHIE Co.: Berea, dry hillside-field, Aug. 21, 1922, *L. F. & F. R. Randolph*, 1376 (G). NORTH CAROLINA. RUTHERFORD Co.: Hickory Nut Gap, Salola Mt., to Chimney Rock, Oct. 3, 1901, *J. K. Small & A. M. Huger* (NY). HENDERSON Co.: dry

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same applies to (333), which bracketed number represents the number under which it was distributed.

woods, East Flat Rock, Sept. 15, 1926, *F. W. Hunnewell*, 10014 (G). Macon Co.: Yellow Mt., ex Torrey Herb., *Curtis* (NY). SOUTH CAROLINA. Greenville Co.: Caesar's Head, Aug. 2, 1881, *J. D. Smith* (G); rocky woods, Caesar's Head, Aug. 12, 1881, *J. D. Smith*, 53 (US). GEORGIA. Floyd Co.: without stated locality, *Chapman* (US). McDuffie Co.: sandhills, vicinity of Thomson, Sept. 9, 1908, *H. H. Bartlett*, 1491 (G, US); vicinity of Thomson, Sept. 7, 1907, *H. H. Bartlett* (US). FLORIDA. Jackson Co.: Sneads, Aug. 19, 1942, *R. A. Knight* (F). Alachua Co.: high thin woods, Warrens Cave, Gainesville, Oct. 25, 1927, *Louchs, Miss L. Arnold & E. West* (F); dry roadside, Sugarfoot, Gainesville, Aug. 28, 1932, *Miss L. Arnold* (F). ONTARIO. Lambton Co.: Port Franks, Aug. 31, 1905, *C. K. Dodge* (G, US); sandy open ground near L. Huron, Port Franks, Sept. 2, 1929, *E. J. Palmer*, 36270 (G); near Sarnia, Aug. 18, 1892, *C. K. Dodge*, 11587 (Ot); rather low grounds, Point Edwards, July, 1887, *Burgess*, 9854 (Ot); Sarnia, Aug. 16, 1901, *J. M. Macoun*, 22614 (Ot); among small oaks, near Sarnia, Sept. 8, 1904, *C. K. Dodge*, 1 (Ot, US); 4 mis. s. of Grand Bend, Sept. 3, 1934, *H. H. Brown*, 4661, 4667 (HB); Grand Bend, Aug. 6, 1932, *Marie-Victorin, R. Germain & Jacques*, 49246 (To). Kent Co.: Squirrel Is., Aug. 31, 1904, *C. K. Dodge*, 2 (Ot, US). Essex Co.: woods, Sandwich, July 27, 1901, *J. M. Macoun*, 26615 (Ot); Point Pelee, Aug. 24, 1931, *H. H. Brown* (HB). MICHIGAN. Co. undetermined: Union Pier, Sept. 19, 1934, *Miss A. Fishman*, 231 (O). Keweenaw Co.: without stated locality, Aug. 1889, *O. A. F.* (G). St. Clair Co.: Fort Gratiot, ex Torr. Herb. *Dr. Pitcher*, 1829 (NY); near Port Huron, Aug. 30, 1892, *C. K. Dodge* (US). Calhoun Co.: east of Albion, Aug. 9, 1906, *C. E. Barr* (G). St. Joseph Co.: without stated locality, Sept. 2, 1838, *Houghton* (NY). OHIO. Without stated locality. *Herb. Schw.* (P). Co. undetermined: Margaretta Ridge, near Mt. Clemens, Sept. 25, 1904, *E. L. Moseley* (US). Erie Co.: sand dune, Cedar Point, *R. J. Webb*, 5491 (G). Lucas Co.: 10 mis. w. of Toledo, Sept. 2, 1897, *E. L. Moseley* (US). Wood Co.: Plain twsp., Sect. 21, Aug. 10, 1937, *R. E. Shanks*, 2201 (NY). Ross Co.: Scioto Trails State Forest, dry wooded hills, Stoney Creek, Aug. 19, 1935, *D. Demaree*, 11532 (US). INDIANA. Steuben Co.: 1½ mi. n. of Clear Lake, Sept. 11, 1904, *C. C. Deam* (NY); sandy woods, e. side of Clear Lake, Sept. 11, 1904, *C. C. Deam* (M, type of *Laciniaria scariosa* var. *petiolata* Lunell). La Grange Co.: high dry bank, e. side of Pretty Lake, Aug. 27, 1914, *C. C. Deam*, 14876 (G); on the bank of the Pigeon R., about 2 mis. e. of Ontario, Aug. 30, 1914, *C. C. Deam*, 15050 (US). Porter Co.: sand dune, n. of Mineral Springs, Aug. 14, 1911, *C. C. Deam*, 9620 (M, type of *Laciniaria scariosa* var. *intermedia* Lunell); Dune Park, Sept. 4, 1906, *L. M. Umbach*, 1447 (US).

LAKE Co.: open sandy woods, Miller's, Sept. 20, 1914, *F. W. Johnson*, 1525 (NY); Buffington to Pine, old beaches "Lake Chicago", Sept. 20, 1901, *E. S. Steele*, 183 (US 609101); MARSHALL Co.: Indiana Harbour, Aug. 26, 1916, *C. C. Deam*, 21299 (G); copse near Lost Lake, Lake Maxinkuckee, Culver, Aug. 21, 1926, *J. R. Churchill* (G); Lake Maxinkuckee, 1899, *B. W. Evermann*, 1118 (US); sandy open knoll, outlet of Lost Lake, Plymouth, Sept. 3, 1909, *H. W. Clark* (US). STARKE Co.: sandy soil, along N. Y. C. Rwy., 1.3 mi. w. of North Judson, Sept. 6, 1941, *C. M. Ek* (G, NY). HARRISON Co.: Barrens s. e. of Corydon (albino), Sept. 5, 1836, *Mr. Clapp* (G). KENTUCKY. WHITLEY Co.: dry sand bank along Rwy., Cumberland Falls, Sept. 11, 1940, *F. T. McFarland*, 66 (G, NY). TENNESSEE. ROANE Co.: Malden's Ridge near Harriman, Aug. 20, 1903, *Biltmore Herb.*, 2670g (US). SEQUATCHIE Co.: dry conglomerate rocks, Cagle, Aug. 17, 1938, *H. K. Svenson*, 9659 (G). HAMILTON Co.: dry soil, Lookout Mt., Aug. 24, 1897, *Biltmore Herb.*, 2670 (NY, G) (US 957898, 332418); Lookout Mt., Sept. 6, 1877, *L. F. Ward* (US 134395). ALABAMA. Without stated locality: Sept. 1841, *ex Herb. G. Thurber, S. B. Buckley* (G). WISCONSIN. POLK Co.: St. Croix Falls, Aug. 13, 1900, *C. F. Baker* (G). BROWN Co.: Preble (plant to right), Aug. 21, 1878, *J. H. Schuette* (G). WAUSHARA Co.: Wild Rose, Aug. 8, 1919, *W. L. McAtee*, 3053 (US). JUNEAU Co.: 2 mis. s. of Mather, Aug. 27, 1937, *J. W. Thomson* (NY); Camp Douglas, Aug. 20, 1890, *E. A. Mearns*, 141 (NY); Camp Douglas (albino), Aug. 28, 1890, *E. A. Mearns*, 141 (US). SHEBOYGAN Co.: sandy ridges, s. of Sheboygan, Aug. 11, 1904, *L. H. Shinners*, 2554 (NY). COLUMBIA Co.: Dells of the Wisconsin, Aug. 19, 1893, *Amer. Ass. Adv. Sci. Meet.* (NY). SAUK Co.: vicinity of Kilbourn, on Wisconsin R., Aug. 25, 1909, *E. S. Steele*, 11d (NY); on the cliffs, Devil's Lake, Aug. 31, 1909, *E. S. Steele*, 90b (NY); rocky ground, about Devil's Lake, Baraboo, Sept. 7, 1925, *E. J. Palmer*, 28383 (G). GRANT Co.: prairies, Boscobel (plant to left), July 1886, *C. H. Sylvester* (NY). MINNESOTA. ANOKA Co.: Moore Lakes, Sept. 5, 1926, *P. A. Rydberg*, 9673 (NY). ILLINOIS. COOK Co.: Lakeview, Sept. 7, 1882, *W. Deane* (G); prairie, near S. Chicago, Sept. 15, 1910, *O. E. Lansing*, 2858 (G, US); Chicago, *Dr. Scammon* (NY); vicinity of Palos Park, Sept. 6–7, 1909, *E. S. Steele*, 132a (US 672726). PEORIA Co.: exposed hillside, gravelly soil, Peoria, Sept. 3, 1908, *F. E. Mc Donald* (US 609908). MISSOURI. PIKE Co.: McCune, Aug. 25, 1916, *J. Davis*, 250 (US). JACKSON Co.: Dodson, Aug. 22, 1895, *B. F. Bush*, 242 (US). OZARK Co.: rocky open ground, near top of Bald Jesse, near Gainesville, Oct. 10, 1927, *E. J. Palmer*, 33071 (G). GREENE Co.: vicinity of Strafford, Aug. 27, 1912, *P. C. Standley*, 9478 (G). TANEY Co.: open rocky ground,

Malva, Sept. 17, 1924, *E. J. Palmer*, 26189 (G). ARKANSAS. Co. undetermined: Ozarks, on high banks along Frisco Rwy., Sept. 10, 1927, *A. Ruth*, 79 (US). Faulkner Co.: dry hills, Quitman, Sept. 4, 1934, *D. Demaree*, 10950 (NY). Lonoke Co.: Carlisle, July 31, 1938, *D. Demaree*, 18012 (O); Pressure Reservoir, Hot Springs National Park, July 20, 1934, *H. R. Gregg*, 269 (US). Yell Co.: ridges, Mt. Nebo State Park, Aug. 30, 1939, *D. Demaree*, 20593 (G). Garland Co.: along Rwy., near Gulph Bridge, July 19, 1935, *F. J. Scully*, 374a (G); near Hot Springs, 1928, *R. Runyon*, 1179 (NY); summit of hills, Hot Springs, July 20, 1931, *R. Runyon*, 1500 (US). Sevier Co.: Prairie de Queen Park, July 1937, *P. W. Beck* (O). Drew Co.: Monticello, Sept. 10, 1938, *D. Demaree*, 18297 (I); old fields 9 mis. s. of Monticello, Aug. 30, 1936, *D. Demaree*, 13574 (G, O). Hempstead Co.: Ozan, Aug. 25, 1937, *D. Demaree*, 15967 (O). Miller Co.: Texarkana, Aug. 20, 1896, *A. A. Heller & E. G. Heller*, 4125 ((G, NY, US)). LOUISIANA. Co. undetermined: W. Louisiana, 1839, *Dr. Hale* (US). Caddo Co.: open dry field, along low woods, Pine Hill Rd., ca. 5 mis. n. w. of Shreveport, Aug. 6, 1938, *D. S. Correll & H. B. Correll*, 10090 (NY). OKLAHOMA. Mayes Co.: dry hillside pasture, Adair, Sept. 2, 1913, *G. W. Stevens*, 2581 (G, NY). Tulsa Co.: Tulsa, Oct. 30, 1913, *G. W. Stevens*, 2989 (G). Creek Co.: Arkansas R., Aug. 21, 1895, *J. W. Blankinship* (G). Muskogee Co.: Lot 1, July 23, 1927, *E. L. Little*, 1903 (O); Lot 3, Sept. 7, 1927, *E. L. Little*, 3127 (O); 2 mis. w. of Muskogee, Aug. 8, 1926, *E. L. Little*, 257 (O); near Muskogee, Sept. 25, 1896, *L. F. Ward*, 10 (US). Hughes Co.: prairie, Aug. 26, 1938, *C. C. Smith* (O). Seminole Co.: Seminole (albino), July 21, 1936, *M. Hopkins & D. Demaree*, 48 (O). Le Flore Co.: Stapp, Aug. 25, 1937, *D. Demaree* (O); in open woods, in mt. valley, Page, Sept. 9, 1913, *G. W. Stevens*, 2714 (G); on s. side of Rwy. embankment, near Page, Sept. 8, 1913, *G. W. Stevens*, 2627 (G, NY). Latimer Co.: Wilburton, Aug. 10, 1930, *O. M. Clark* (O). Pittsburg Co.: McAlester, Aug. 8, 1894, *C. S. Newhall* (G). TEXAS. Grayson Co.: Denison, Sept. 13, 1906, *F. J. Tyler* (US). Gregg Co.: without stated locality, Autumn, 1941, *C. L. York* (G). Harris Co.: Houston, 1842, *Lindheimer* (G). Waller Co.: Hempstead, Aug. 28, 1932, *B. C. Tharp* (G).

This species is widely distributed but has not always been accepted, having been referred to *L. scariosa* by Torr. & Gray (Fl. N. Am. ii. 75 (1841)) and again by Gray (Synop. Fl. 1^2. 110 (1884)). Examination of a photograph at the Gray Herbarium of the type specimen collected by Michaux in the "Illinois meadows", though not showing a complete plant, made it possible

to determine the nature of the phyllaries. The outer ones are recurved, the middle and inner ones have rounded or spatulate tips with broad petaloid margins and are clearly crisped. In pressing, these have sometimes been folded back on themselves or left concave and cup-like. The upper cauline leaves are linear-lanceolate with acute tips. As Greene, who recognized this species under *Laciniaria* (Pittonia, iv. 318 (1901)) stated, it is difficult "to understand on what principle a plant so well marked as this could be confused . . . with *L. scariosa*". From the type of that species it is easily known by the middle and inner, glabrous, broadly scarious, bullate phyllaries, rather than herbaceous, squarrose ones, and by the acute lanceolate, rather than oblanceolate, leaves.

Michaux had given Illinois as the type locality for this species. From the account in his journal (Proc. Amer. Phil. Soc. xxvi. 129 (1888)) and the map of F. A. Michaux[1], Illinois would be as far west as he had travelled and would refer to the region east of the Mississippi, there being no Indiana at that time. Plants with the familiar puckered heads of the *aspera* type are now known to occur from southern Ontario, Michigan and Ohio south to the Carolinas and southwestward to Louisiana, Texas and Oklahoma. When leaves of specimens from Illinois southward and westward are examined it is found that some are rough, some glabrous and some of varying degrees of intermediacy of pubescence. In contrast, the southeastern specimens, from the mountains of Tennessee to South Carolina, Alabama and Florida, are more constantly glabrous. To the author, therefore, it seemed best to broaden Michaux's conception of the species to allow for leaves from very rough to very smooth and to consider them as two varieties, the typical and the glabrous respectively. The lists of specimens so separated show the range of the former from Wisconsin, Indiana and Illinois westward while the latter extends eastward, as well, into Kentucky and the Carolinas and from there southward into Alabama and Florida.

When examining the types of Lunell's numerous varieties of *Laciniaria scariosa* it was found that two of the seven (see also no. 20), namely var. *intermedia* (which was later called *media*) and var. *petiolata*, both from Indiana, come under the glabrous

[1] Travels to the westward of the Alleghany Mountains. J. Mawman (1805).

variety of *L. aspera* Michx. as here interpreted. Lunell's earlier name *intermedia* takes precedence in this new varietal combination, which has been made on the basis of the characters of his type and not upon the characters described and classified by him. The glabrous *Liatris sphaeroidea* of Michaux, however, is not included in synonymy.

Michaux (l. c.) described *L. sphaeroidea* as having smooth leaves, pedunculate flowers and oval erect bracts and gave as habitat the high mountains of Carolina as well as the meadows of Illinois. The identification and delimitation of *L. sphaeroidea* and *L. aspera* has been a perplexing matter. Comparison of the photographs of Michaux's two plants seen at the Gray Herbarium, reveals similar inflorescences of large heads in loose racemes, though they are sessile in the latter and short-pedunculate in the former. Since within other species all conditions from sessile to pedunculate heads occur, that character is not diagnostic. The phyllaries, however, are of different shapes and quite differently disposed in the two specimens. The outer ones of *L. sphaeroidea* are outspread but hardly recurved. The middle and inner ones are erect, elongate, oblong and slightly spatulate at the tip, with narrow scarious borders, some just a little crisped but none really concave as in *L. aspera*. As stated above, Michaux referred to smooth leaves in *L. sphaeroidea* in contrast to very rough ones in *L. aspera* and gave it a habitat in the high mountains of Carolina as well as in the meadows of Illinois.

Careful search for specimens resembling Michaux's type of *sphaeroidea* in the characters of the head and phyllaries, rather than just in smooth leaves or pedunculate heads, shows a great many from around the Great Lakes region. Since on the label of Michaux's type-specimen occurs "Prairies vers Mississippi" it seems that there may be some justification for the interpretation of his species being like many of those of the Great Lakes Basin. Where it occurs along with *L. aspera*, as it does among the pine-oak scrub on the sand-ridges of the southeastern shore of Lake Huron in Ontario, it is often difficult to be sure of the determination, especially when it has grown under particularly unfavorable circumstances or during unusually dry summers. To this author, *L. sphaeroidea* occurring as glabrous, semi-hirsute and hirsute plants, comes very close to and is perhaps

some hybrid of *L. aspera* Michx. Whether it may have arisen originally in the more central northern region as an intermediate between *L. aspera* and *L. ligulistylis* we cannot say.

L. aspera Michx. is undoubtedly the species of widest geographic range of the *Scariosae* series and is therefore responsible for many confusing mid-forms. At the northwestern limit of the range of *L. aspera*, as in Wisconsin, Minnesota and North Dakota, it meets *L. ligulistylis*. From this species, with fewer large heads and erect, lacerate phyllaries, it is clearly distinguishable. The presence of pilosity in the corolla-tube of *L. aspera* and its absence in *L. ligulistylis* makes a very satisfactory additional character for confirmation of the separation of the two. On this basis seven of Lunell's varieties of *Laciniaria scariosa* have been transferred to *L. aspera* (five under var. *typica* and two as var. *intermedia*), while nineteen others were included under *L. ligulistylis*. Intergradations between the two species, however, are numerous and varied and eight of these were recognized also among Lunell's *scariosa* varieties (see no. 20). With all the recombinations of leaf-, stem-, head-, phyllary- and corolla-tube-characters, these intermediate specimens, found mostly west of Lake Michigan, are nevertheless distinguishable by the generally larger and more hemispherical mature heads from the segregate that we have interpreted as × *L. sphaeroidea* Michx. of the Great Lakes region with smaller, more campanulate or globular heads. That they more nearly resemble *L. aspera* can be judged by the confusion of interpretation seen in various authors' lists of synonyms. By contrast, × *L. Neiuwlandii* (Lunell) Shinners (see no. 20) has a recognizably stronger relationship to *L. ligulistylis* and may represent a more recent derivative.

That no specimens of × *L. sphaeroidea* are here listed as occurring in the high mountains of Carolina, which were included along with the meadows of Illinois as the habitat, may perhaps be due to Michaux having casually matched his specimen by its glabrosity with the variety of *L. aspera* to be found in that region (var. *intermedia*), without giving weight to the differences he noted in the phyllaries of the two species he described. There might also have been specimens of the *L. scariosa* var. *virginiana* that Michaux saw occurring in those mountains, with the phyllaries less reflexed and with slightly more scarious margins than in

variety *typica*, for he certainly thought of *L. scariosa* as having wholly herbaceous phyllaries; to wit his observation under *L. squarrulosa* "Videtur Serratula *scariosa L.* non autem video cur, Pluknetio duce, scariosam dixerit." Examination of Michaux's herbarium for any further specimens from the Carolina region would certainly be interesting and might help final elucidation of this alliance, which has been so variously interpreted.

Laciniaria Deamii Lunell (Amer. Mid. Nat. ii. 169 (1912)), described from a plant of C. C. Deam, no. 1747, from the base of open dunes, just south and east of Indiana Harbor, Lake Co., Ind. (I), can be included under this interpretation of × *L. sphaeroidea* because of the wholly glabrous phyllaries, petaloid on the margins and a little crisped, and the campanulate heads of about thirty flowers. Examination of *N. C. Fassett*, no. 21207, from Bear Lake, Wolf Lake, Noble Co., Ind., Sept. 11, 1941 (W), which by Shinners (Amer. Mid. Nat. xxix. 31 (1943)) was made the type of × *L. Deamii* (Lunell) Shinners f. *albina*, showed marked differences from Lunell's type, aside from the flower-color, in the almost wholly herbaceous and somewhat pubescent phyllaries and the few (8 fully developed) large heads of 45–50 flowers. Like it, a plant of normal color, no. 21208, collected at the same time and place by N. C. Fassett, in the large terminal heads seems rather to show relationship to × *L. Nieuwlandii*, the type of which was described from Indiana.

That × *L. sphaeroidea* has a stable identity is judged from the number of times it has probably been one of the parents in other recognized hybrids. It has seemed to cross with species of two other series including one of each other section, as with *L. spicata* of the *Spicatae* series in the production of × *L. Steelei* (see no. 1) and with *L. cylindracea* of the *Cylindraceae* series and section *Euliatris* in × *L. Gladewitzii* Farwell (see no. 31).

× Liatris sphaeroidea Michx. Rootstock irregular, subglobose, 2–5 cm. in diameter: stems one or few, 4–11 dm. high, from glabrous to asperous as in *L. aspera:* leaves glabrous, somewhat pubescent or asperous, linear-lanceolate, the basal 1–1.5 dm. long and ca. 1 cm. wide, subpetiolate, reduced upwards to narrowly lanceolate ones not much longer at the base of the inflorescence than the heads subtended: inflorescence a raceme or panicle of numerous, 20–40, sessile or pedicellate heads of 25–40 flowers: heads barely globose (when young cylindric-campanulate)

with phyllaries only slightly bullate or crisped, all loosely erect; outer ones obovate or oblong with slightly spatulate and scarious-margined tips, middle ones more elongate and with the spatulate ends still scarious-margined and only slightly crisped; corolla usually purple, sometimes pale mauvish pink, rarely white; tube ca. 9 mm. long, pilose within; pappus 7–8 mm. long, barbellate; achene 4–5 mm. long.—Fl. Bor.-Amer. ii. 92 (1803). Ell. Sk. ii. 281 (1822?); DC. Prodr. v. 130 (1836); not *L. sphaeroidea* sensu Shinners, Amer. Mid. Nat. xxix. 35 (1943). *Suprago sphaerocephala* Cass. Dict. li. p. 386 (1827). *Laciniaria Deamii* Lunell, Amer. Mid. Nat. ii. 169 (1912). *Liatris scariosa* var. *Deamii* Peattie, Amer. Mid. Nat. x. 132 (1926). × *Liatris Deamii* (Lunell) Shinners, Amer. Mid. Nat. xxix. 31 (1943), in part.

Southern Ontario to Minnesota and Nebraska, south to Tennessee and Arkansas.—ONTARIO. Lambton Co.: dry poor soil, Walpole Is., Sept. 24, 1909, *C. K. Dodge* (US). Essex Co.: in open woods, Leamington, July 30, 1892, *J. M. Macoun*, 22769 (plant to left) (Ot). MICHIGAN. Delta Co.: in jack pines, near Rapid R., Aug. 19, 1933, *F. C. Gates*, 17430 (US). St. Clair Co.: dry sandy soil, near Port Huron, Aug. 10, 1896, *C. K. Dodge* (US); Lakeside Cemetery, Port Huron, Aug. 28, 1904, Aug. 23, 1911, *C. K. Dodge* (US). Ingham Co.: along roadside in sand, Haslet, Aug. 30, 1917, *T. G. Yuncker*, 723 (US). OHIO. Co. undetermined: top of dry cliff, Ross Hollow, Sept. 27, 1936, *Bartley & Pontius*, 152 (NY). Erie Co.: Cedar Point, Oct. 8, 1904, *E. L. Moseley* (US). Lucas Co.: Spencer Twsp., sandy soil, Sept. 26, 1921, *E. L. Moseley* (US); several mis. n. w. of Whitehouse, Aug. 28, 1927, *E. L. Moseley* (US). INDIANA. Steuben Co.: in sandy wood, e. side of Clear Lake, Aug. 21, 1904, Sept. 9, 1904, *C. C. Deam* (G). Porter Co.: Dune Park, Sept. 2, 1898, *L. M. Umbach* (US 609933); Dune Park, Sept. 17, 1909, *E. S. Steele*, 160 (G, US 609009); on and among dunes. Dune Park, Sept. 17, 1909, *E. S. Steele*, 162b (US 609017). Lake Co.: near L. Michigan, about ¼ mi. from lake-front, 1906, *C. C. Deam*, 1747 (US); sandy pine ridges, Pine, Sept. 28, 1910, *O. E. Lansing*, 2889 (G); Indiana Harbor, Sept. 15, 1909, *E. S. Steele*, 150b (US 608997); 153b (US 609044); base of open dunes, just s. & e. of Indiana Harbor, Sept. 23, 1906, *C. C. Deam* (I, type of *Laciniaria Deamii* Lunell); Hammond, old beaches, "Lake Chicago", Sept. 14, 1909, *E. S. Steele*, 143a, 146a, 146c (G); Sept. 18, 1909, *E. S. Steele*, 174a (US 609078); Buffington to Pine, old beaches "Lake Chicago", Sept. 20, 1909, *E. S. Steele*, 184a (US 609014), 184c (G, US 609106), 151c (US 672715), 180b (G), 180g (US 699097), 189e (G, US 609127), 189f (G), 187a (G, US), 188b (G, US 609123). KENTUCKY. Rowan Co.: prairie patch, Clack Mt., Sept. 27, 1936, *Miss E. L. Braun* (G). TENNESSEE. Knox Co.: vicinity of Knoxville, Sept.

18, 1890, *F. Lamson-Scribner* (US). WISCONSIN. Burnett Co.: dry sandy ground n. of Danbury, Aug. 26, 1940, *L. H. Shinners & J. Catenhuse* 2836 (G). Brown Co.: Preble (plant to right), Aug. 21, 1878, *J. H. Schuette* (G). Sauk Co.: rocky ground, about Devil's Lake, Sept. 7, 1925, *E. J. Palmer* 28383 (G); Devil's Lake, Aug. 15, 1881, *J. M. Holzinger* (US); eastern range of cliffs, Devil's Lake, Aug. 31, 1909, *E. S. Steele*, 90c (US 608814), 90e (US 608812), 90h (US 608817); vicinity of Kilbourn, Aug. 30, 1909, *E. S. Steele*, 79 (US); dry sandy bluffs of river, vicinity of Kilbourn, Aug. 25, 1909, *E. S. Steele*, 11b (US 619845), 11c (US 608703). MINNESOTA. Itasca Co.: sandy soil, Grand Rapids, Aug. 1891, *J. H. Sandberg*, 741 (US). Otter Tail: sandy soil, Richdale, Aug. 13, 1912, *Z. L. Chandonnet, 0.1* (US); sandy hills, Richdale, Aug. 28, 1913 (no. 136), Aug. 12, 1914 (no. 280) *Z. L. Chandonnet* (US); Todd Co.: dry sandy soil, Staples, Aug. 19, 1912, *Z. L. Chandonnet*, 19, 25, (US); sandy soil, Staples, Aug. 22, 1913, *Z. L. Chandonnet*, 130 (US). Chisago Co.: Center City, July 1892, *B. C. Taylor*, plant 2 (G). ILLINOIS. Cook Co.: pebbly clay of Valparaiso moraine, vicinity of Palos Park, Sept. 6–7, 1909, *E. S. Steele*, 132a (US 608918), 133 (US 608929); Rogers Park, old beaches, "Lake Chicago", Sept. 4, 1909, *E. S. Steele*, 105 (G, US 608862), Sept. 10–11, 1909, 141a (US 608960), 140 (G, US 608966); dry open woods, sand dunes, Miller's, Sept. 4, 1911, *E. E. Sherff* (G). IOWA. Fayette Co.: prairies, Sept. 5, 1894, *B. Fink*, 617 (US). Cherokee Co.: ca. 3 mis. s. of Cherokee, on upland slopes, Pilot Twsp., Sect. 23, Sept. 5, 1937, *Miss A. Hayden*, 10537 (G). Johnson Co.: without stated locality, Sept. 9, 1909, *M. P. Somes*, 3873 (US). ARKANSAS. Carroll Co.: dry hillsides, Eureka Springs, Sept. 20, 1913, *E. J. Palmer*, 4404 (US). NEBRASKA. Pierce Co.: Plainview, Sept. 7, 1908, *W. F. Petersen* (US). KANSAS. Shawnee Co.: Topeka, Aug. 22, 1877, *E. A. Popinoe* (US).

× Liatris Weaveri Shinners (*L. aspera* × *punctata*). Stems slender, 12–24, from an elongate, penetrating rootstock ca. 10 cm. long, 4–5 dm. tall, mostly glabrous but with some whitish pubescence along the upper part of the flowering stalk and bearing many, punctate, linear to narrowly linear-lanceolate leaves as in *L. punctata;* lower ones 15 cm. long, 0.5–1 cm. wide, reduced gradually upwards to bracts exceeding the basal heads: inflorescence 15–30 cm. long, dense and spike-like; heads numerous, campanulate to turbinate, 1.5–2 cm. long and 1–1.5 cm. wide, 12–15-flowered; phyllaries linear-lanceolate, erect and moderately loose; outer ones herbaceous oblong or somewhat triangular with acute tips, 5–7 mm. long; middle and inner ones up to 1.5 cm. long and 3–5 mm. wide, oblong, blunt at tip, with a narrow scarious, erose, paler margin; corolla purple, 9–11 mm. long,

quite pilose within; achenes ca. 5 mm. long; pappus 8 mm. long and plumose.—Amer. Mid. Nat. xxii. 38 (1943).

The type of this hybrid was one plant (no. 16) of a seedling population grown from seeds (received in 1926, from Dr. E. J. Weaver and collected from uplands near Lincoln, Lancaster Co., Neb.) in 1927 at Crediton, Ontario by L. O. Gaiser. Plants no. 4 and 17, also mentioned in the description by Shinners (l. c.), were of the same and of the 1928 population respectively grown likewise from seeds of the same package. Both Dr. Weaver and myself are at a loss to explain the location "Locarina, Nebraska" given for the type specimen by Shinners. Other specimens from the same plants are now placed in the Gray Herbarium.

The rest of the seedlings grown during the two successive years 1927 and 1928 were quite like the herbarium specimens of *L. aspera* Michx. var. *typica* received along with the seeds. Herbarium specimens and a package of seeds of *L. punctata* that were received from Dr. Weaver at the same time, from the same locality, proved to be variety *nebraskana*, having the characteristic narrow leaves, lacking prominent cilia on the margin and the slender heads with narrow, lanceolate phyllaries, also without marginal cilia. Thus it seems very probable that the three seedlings were the result of hybridization in the field of *L. aspera* var. *typica* and *L. punctata* var. *nebraskana*. As Shinners understood *L. sphaeroidea* in the same sense as *L. aspera* var. *typica*, as used here, the parentage given above is really the same as that given by him.

These hybrids resemble *L. punctata* var. *nebraskana* in the tufted, numerous, slender stems, much shorter than those of *L. aspera* seedlings growing alongside, in the numerous punctate, linear leaves, the shorter, dense, spike-like inflorescence and the plumose pappus. In the pubescence along the upper part of the stem, the campanulate to turbinate heads of 12–15 flowers with phyllaries that are loosely erect, having the middle ones broader, narrowly scarious and blunt-tipped, and the length of the achene they resemble *L. aspera*.

From viable seeds collected from each of the three seedling plants, F^2 populations were grown. They were indeed a mixed lot showing sometimes greater resemblances to *L. aspera* and sometimes to *L. punctata*.

19. Liatris scabra (Greene) K. Schum. Stems straight, stiff, from a somewhat rounded corm 2 cm. or more in diameter, covered with retrorse hairs and distinctly scabrous, generally 6–9 dm. high, bearing about 20–30 usually short-peduncled heads in an open spike, rarely becoming paniculate: leaves scabrous on upper and lower surfaces, the lower 10–15 cm. long and 10–25 mm. wide, oblanceolate, narrowing to a winged petiole less than half the length of the blade; upper leaves bluntly lanceolate, 4–5 cm. long and 5 mm. wide, non-petiolate and with clasping base, tending to diverge from the stem at right angles: inflorescence of 20–35-flowered heads, ca. 2 cm. long and 1.5–2 cm. wide when flowers are open, somewhat cylindrical to turbinate, frequently all on short pedicels or with the basal becoming long-pedunculate; phyllaries entirely herbaceous and green, densely pubescent with short hairs or scabrous, margin ciliolate, the outer ovate to acute and sometimes recurved, the inner and middle oblong-obovate, spatulate with almost orbicular tips, generally erect and appressed without any or with hardly any colored rim; corolla-tube pilose within, 10–15 mm. long; pappus 8–10 mm. long; achene ca. 5 mm. long.—Just, Bot. Jahresb. xxix. 569 (1903). *Laciniaria scabra* Greene, Pittonia, iv. 317 (1901). *Laciniaria Shortii* Alex. in Small, Man. S. E. Fl. 1335 (1933) in part. *Liatris aspera* sensu Shinners, Amer. Mid. Nat. xxix. 34 (1943), not Michx.—Ohio and Illinois to Alabama and Mississippi, and westward into Arkansas and Oklahoma.—OHIO. Without stated locality, 1842, *C. W. Short* (NY, type of *Laciniaria Shortii* Alex.). Erie Co.: Castalia prairie, Sept. 19, 1909, *E. L. Moseley* (US). Ottawa Co.: Port Clinton, Aug. 13, 1895, *E. L. Moseley* (G, US); Catawba Isl., Sept. 5, 1897, *E. L. Moseley* (US); between Port Clinton & Catawba Isl., Aug. 13, 1895, *E. L. Moseley* (US). Franklin Co.: Georgesville, Aug. 29, 1892, *W. C. Werner* (NY). INDIANA. Cass Co.: along rwy., 1 mi. e. of Lake Cicott, Aug. 16, 1940, *C. M. Ek* (NY). Vigo Co.: without stated locality, *W. S. Blatchley* (US). Brown Co.: crest of open wooded knob, ca. 9 mis. s. e. of Nashville, Oct. 10, 1935, *C. C. Deam*, 56936 (G). Jackson Co.: open chestnut oak ridge, 4 mis. n. w. of Medora, Sept. 4, 1934, *R. M. Kriebel*, 3022 (G). Washington Co.: s. slope of Quercus ridge, 12 mis. n. of Salem, Oct. 5, 15, 1916, *C. C. Deam*, 22461 (US). Harrison Co.: sterile wooded slope, ca. 3 mis. n. of Elisabeth, Oct. 16, 1917, *C. C. Deam*, 24374 (US); s. slope of Elisabeth Hill, 3 mis. e. of Elisabeth, Oct. 13, 1916, *C. C. Deam*, 22429, 22432 (US). KENTUCKY. Co. undetermined: barrens of Kentucky, Sept. 1835, *C. W. Short* (G). Bullitt Co.: Shepherdsville, Sept. 3, 1903, *Biltmore Herb.*, 2670f (US). Edmonson Co.: dry woodlands, near Mammoth Cave, Sept. 21, 1903, *Biltmore Herb.*, 2670i (US). MISSISSIPPI. Oktibbeha Co.: Starkville, Oct. 1, 1889, *S. M. Tracy* (US).

ILLINOIS. Co. undetermined: pine hills, Sept. 23, 1890, *F. S. Earle*, ND, type). ARKANSAS. Pulaski Co.: north of White City Park, Little Rock, Sept. 19, 1931, *D. Demaree*, 8200, 8211 (US); open dry woods, Pulaski Heights, Little Rock, Sept. 15, 1931, *D. Demaree*, 8172 (G, NY, US); near White City Park, road to Quarry, Little Rock, Sept. 30, 1931, *D. Demaree*, 8333 (US). Garland Co.: dry slopes of West Mt., Hot Springs, Oct. 15, 1925, *E. J. Palmer*, 29229 (NY); dry woods, Sleepy Water Rd., Hot Springs, Sept. 8, 1935, *F. J. Scully*, 500 (G). Jefferson Co.: open pine-oak-hickory ridge woods, Pine Bluff, Oct. 1, 1942, *D. Demaree*, 24099 (G). Clark Co.: high, dry, rocky wooded hill, Oct. 28, 1932, *D. Demaree*, 10001 (NY). Ashley Co.: knolls in open woods, Hamburg, Sept. 27, 1937, *D. Demaree*, 16351 (NY); prairie-like regions, Fountain Hill, Oct. 11, 1937, *D. Demaree*, 13919 (O). LOUISIANA. Natchitoches Co.: dry open woods, Natchitoches, Oct. 3, 1915 (no. 8799), Oct. 7, 1917 (no. 8888), *E. J. Palmer* (US). Rapides Co.: pinelands, Sept. 10, 1900, *Biltmore Herb.*, 2670n (US), Alexandria, *Dr. Hale* (NY), Alexandria, *J. Hale* (NY). OKLAHOMA. Le Flore Co.: severely cut pine-oak woods, Kiamichi Mts., July 17, 1930, *E. L. Little & C. E. Olmstead*, 603 (O). Pushmataha Co.: open areas in oak forest, Aug. 27, 1938, *C. C. Smith*, 918 (O).

This species is quite unlike *L. aspera* Michx. in the densely scabrous stem and leaves, and the herbaceous, green, pubescent to scabrous phyllaries, non-scarious on the margin and mostly erect and appressed, or with only the outer ones squarrose, and none crisped or bullate. However, plants with involucral and leaf-characters intermediate between these two species have been seen from Indiana, Arkansas and Kansas, which are in the range of both; e. g. Oct. 10, 1935, *C. C. Deam*, no. 56936, from 9 mis. e. of Nashville, Brown Co., Indiana (G); Sept. 12, 1895, *J. B. Norton*, no. 214, from prairie, Riley Co., Kansas (G), and Oct. 28, 1932, *D. Demaree*, no. 10001, from Amity, Clark Co., Arkansas (G), though the specimen of the last collector's number and date at the New York Botanical Garden seems more nearly to resemble *L. scabra*.

L. scabra can be differentiated from *L. scariosa* by the arrangement of the phyllaries as well as the shape of the leaves; in *L. scariosa* of the Eastern States the basal leaves are broadly obovate. However, it is not difficult to think of *L. scabra* as a modification of *L. scariosa* as it travelled westward. In fact it was rather startling to see how very much the heads and phyllaries

of the Oklahoma plants from the Kiamichi Mts. resembled those of *L. scariosa* from the southern Appalachian Mts.

20. Liatris ligulistylis (Nels.) K. Sch. Corm shallow, rounded, 1–4 cm. in diameter: stems single or several, 1–6 dm. high, glabrous below with white appressed pubescence on the usually reddish flowering stem or pubescent in most parts: leaves varying from glabrous to sparingly hispidulous along mid-vein of lower surface or to densely pubescent on both surfaces but always with cilia on the margin; basal leaves lanceolate-oblong or oblanceolate, 8–15 cm. long and 1–1.5 cm. wide, usually with a long margined petiole (the radical sometimes 20–40 cm. long); leaves reduced abruptly upwards, there more lanceolate, bract-like along a kind of strict spike: inflorescence of comparatively few heads (1–15) on short peduncles 1–5 cm. long, with the terminal head often much larger than the others, with varying conditions of moisture and soil the inflorescence bearing more heads with longer peduncles: heads broadly campanulate, becoming hemispheric, 2–3 cm. wide, 40–70-flowered (terminal one sometimes twice that size); phyllaries glabrous, erect, with less rounded, more irregular, spatulate, broadly lacerate, scarious, usually colored tips, (sometimes the outer phyllaries of older heads appear to have been pressed out and backwards by the expansion of the maturing heads but in young heads are always erect); all phyllaries quite similar in texture though outer ones shorter, oblong, ovate or orbicular; middle and inner ones spatulate-oblong; corolla-tube nonpilose within, but occasionally a few hairs on the outside of base of tube, 9–11 mm. long; pappus 8–10 mm. long, smoky purple when mature; achene 5–6 mm. long.—Just, Bot. Jahresb. xxix[1]. 569 (1903). *Laciniaria ligulistylis* Nels. Bot. Gaz. xxxi. 405 (1901). *Liatris Rosendahlii* Rydb. Brittonia, i. 100 (1931), not sensu Shinners, Amer. Midl. Nat. xxix. 40 (1943). *Liatris Haywardii* and *L. Herrickii* Rydb. (the latter a depauperate specimen) op. cit. i. 99 (1931). *Laciniaria formosa* Greene, Leaflets, i. 145 (1905). *Laciniaria scariosa* (L.) Hill var. *corymbulosa* Sheld. Bull. Geol. & Nat. Hist. Surv. Minn. ix. 77, t. vi (1894), in part = forma *corymbulosa* Sheld. Quart. Bull. Univ. Minn. i. 27 (1892). *Laciniaria scariosa* vars. *basilaris*, *supereminens*, *praeceps*, *praestans*, *multiplex*, *perusta*, *angustata* and *opima* Lunell, Amer. Mid. Nat. ii. 92 (1911). *Laciniaria scariosa* var. *scalaris* Lunell, Amer. Mid. Nat. ii. 127 (1911). *Laciniaria scariosa* var. *subcorymbosa* Lunell, Amer. Mid. Nat. ii. 158–9 (1912). *Laciniaria scariosa* forma *uniflora* Sheldon, Quart. Bull. Univ. Minn. i. 27 (1892), probably. *Laciniaria scariosa* var. *uniflora* Lunell, Amer. Mid. Nat. iii. 344 (1914). *Laciniaria scariosa* vars. *exuberans*, *singularis*, *immanis*, *cristagalli*, *insolens*, *composita*, *annuens* Lunell, Amer. Mid. Nat. v. 31–

46 (1917). *Laciniaria scariosa* var. *inconcinna* Lunell, Amer. Mid. Nat. v. 241 (1919). *Liatris ligulistylis* f. *leucantha* Shinners, Amer. Mid. Nat. xxix. 39 (1943), albino, as was probably *Laciniaria scariosa* f. *globosa* Sheldon, Quart. Bull. Univ. Minn. i. 27 (1892) (this type not seen).

Wisconsin, southern Manitoba, Saskatchewan, and Alberta[1], Minnesota, North and South Dakota, Montana, Wyoming, Colorado, and Northern New Mexico.—WISCONSIN. Co. undetermined: Aug. 1844, *S. B. Mead* (NY). Waukesha Co.: Scuppernong Marsh, Aug. 4, 1941, *H. C. Greene* (G). Jefferson Co.: C. M. & St. P. Rwy., embankment ¾ mi. s. of Palmyra, July 29, 1940, *L. H. Shinners*, 2429 (G). MANITOBA. (border of Ontario) Rainy Lake & River, *Dr. Richardson*, 9853 (Ot). 62 F s. w.: Camp No. 7, South Antler Creek, Aug. 11, 1873, *G. M. Dawson*, Br. N. A. Boundary Comm. (G). 62 F 9: Souris, Aug. 21, 1889, *T. L. Walker* (Q). 62 G 4: open prairie, n. of Killarney, Aug. 4, 1896, *J. M. Macoun*, 12435 (G, NY, Ot). 62 K 6: Birdtail Creek, near Birtle, June 26, 1906, *J. M. Macoun & W. Herriot* 69884 (NY, Ot, US). 62 I 3: border of marshes, Stoney Mt., Sept. 5, 1884, *J. M. Macoun*, 9855 (Ot). 62 K 1: open prairie, Rapid City, July 25, 1896, *J. M. Macoun*, 12241 (Ot). MINNESOTA. Beltrami Co.: Bemidge, July 27, 1925, *L. H. Pammel*, 876 (G). Hubbard Co.: Benedict, July 31, 1914, *H. J. Bergman*, 2971 (G); Cass Lake, July 29, 1914, *L. H. Pammel & H. E. Pammel*, 671 (G); dry sterile sandy opening in jack pine, La Salle Springs, July 2, 1932, *M. F. Buell*, 503 (G); jack pine forest, 11 mis. s. of Hubbard Co. n. border, along Hwy. 71, Aug. 9, 1941, *J. W. Moore & D. L. Jacobs*, 15099 (G). Clear Water Co.: north boundary, Itasca Park, Aug. 18, 1929, *M. L. Grant*, 3114 (G, NY, US); dry sandy soil, e. of La Salle Springs, Lake Itasca State Park, Aug. 17, 1918, *C. O. Rosendahl*, 3699 (M, type of *Liatris Rosendahlii* Rydb.). Becker Co.: brushland, Detroit, Aug. 14, 1914, *Z. L. Chandonnet*, 302 (US). Otter Tail Co.: Silver Lake, Aug. 1892, *E. P. Sheldon* (G). Hennepin Co.: Minneapolis, Aug. 1878, *C. L. Herrick* (M, type of *Liatris Herrickii* Rydb.). Wright Co.: Cedar Lake, Sept. 1890, *F. L. Holtz* (M 211606 (type of *Laciniaria scariosa* forma *uniflora* Sheldon) and probably 211608 though now lacking head). Kandiyohi Co.: Whitefield Twsp. Aug. 1, 1892, *W. D. Frost* (US 201918). Lincoln Co.: Verdi, Aug. 1891, *E. P. Sheldon*, S1364 (M); Lake Benton, Aug. 1891, *E. P. Sheldon*, S1270 (M). NORTH DAKOTA. Rolette Co.: in dry soil, open borders of woodland, Turtle Mountains, near St. John, Aug. 30, 1909, *J. Lunell*, 1026 (M, type of *Laciniaria scariosa* var. *perusta*).

[1] Localities in Manitoba, Saskatchewan and Alberta are indicated by standard notation with reference to sheets of the National Topographical Series, Dept. Mines & Resources, Ottawa, Canada.

Ramsey Co.: in rich prairie soil, Devil's Lake, Aug. 18, 1910, *J. Lunell*, 1021 ((M, type of *Laciniaria scariosa* var. *supereminens* Lunell) NY). McHenry Co.: Towner, Aug. 12, 1908, *J. Lunell* (NY), Aug. 12, 1920, *J. Lunell*, 1016 (M, type of *Laciniaria scariosa* var. *basilaris* Lunell); in rich soil, Towner, Aug. 12, 1908, *J. Lunell*, 1023 (M, type of *Laciniaria scariosa* var. *praestans* Lunell). Benson Co.: Leeds, Aug. 15, 1908, Aug. 6, 19, 1909, *J. Lunell* (G), Aug. 10, 1907, Aug. 6, 9, 10, 1909, *J. Lunell* (NY), Aug. 29, 1899, Aug. 10, 19, 1909, *J. Lunell* (US), Aug. 19, 1909, Aug. 20, 1915, *J. Lunell* (M); in rich soil, Leeds, Aug. 25, 1914, *J. Lunell*, 1018 (M, type of *Laciniaria scariosa* var. *uniflora* Lunell); dry soil, Leeds, Aug. 13, 1910, *J. Lunell*, 1022 (M, type of *Laciniaria scariosa* var. *praeceps* Lunell); moderately dry soil, Leeds, Aug. 15, 1909, *J. Lunell*, 1025 (M, type of *Laciniaria scariosa* var. *multiplex* Lunell); in rich prairie loam, Leeds, Aug. 27, 1918, *J. Lunell* (M, type of *Laciniaria scariosa* var. *inconcinna* Lunell); in meadowland, along coulee, Leeds, Sept. 8, 1908, *J. Lunell*, 1027 (M, type of *Laciniaria scariosa* var. *angustata* Lunell); in moderately moist, rich soil, Leeds, July 31, 1909, *J. Lunell*, 1028 (M, type of *Laciniaria scariosa* var. *scalaris* Lunell); Leeds, Aug. 19, 1914, *J. Lunell*, 1031 (M, type of *Laciniaria scariosa* var. *insolens* Lunell); in rich meadowland, Leeds, Sept. 6, 1910, *J. Lunell*, 1035 (M, type of *Laciniaria scariosa* var. *opima* Lunell); Leeds, Sept. 9, 1916, *J. Lunell*, 1036 (M, type of *Laciniaria scariosa* var. *annuens* Lunell); Butte, Aug. 9, 1908, Aug. 17, 1909, *J. Lunell* (G, US), Aug. 15, 1914, *J. Lunell* (I), Aug. 26, 1917, *J. Lunell* (M), Aug. 22, 1915, *J. Lunell*, 1019 (M, type of *Laciniaria scariosa* var. *singularis* Lunell), Sept. 3, 1916, *J. Lunell*, 1029 (M, type of *Laciniaria scariosa* var. *immanis* Lunell, July 29, 1906, *J. Lunell*, 1030 (M, type of *Laciniaria scariosa* var. *crista-galli* Lunell), Aug. 15, 1915, *J. Lunell*, 1032 (M, type of *Laciniaria scariosa* var. *composita* Lunell), Aug. 26, 1914, *J. Lunell*, 1034 (M, type of *Laciniaria scariosa* var. *subcorymbosa* Lunell); Butte, Aug. 15, 1915, *J. Lunell*, 1024 (M, type of *Laciniaria scariosa* var. *exuberans* Lunell). Kidder Co.: Bird Lake, Dawson, Aug. 10, 1917, *F. P. Metcalf*, 261 (US); Deer Lake, Aug. 15, 1917, *F. P. Metcalf*, 296 (US). Morton Co.: Mandan, Aug. 14, 1927, *E. L. Larson*, 157 (G). SOUTH DAKOTA. Co. undetermined: Black Hills, *Miss Pratt*, 152 (NY). Grant Co.: virgin prairie, Clear Lake, near Big Stone Lake, Aug. 1, 1940, *P. Johnson*, 69 (G). Meade Co.: Black Hills near Fort Meade, July 28, 1887, *W. H. Forwood* (US). Lawrence Co.: limestone slope, Spearfish Canyon, *H. E. Hayward*, 166 (NY, type of *Liatris Haywardii*, Rydb.); Spearfish, Aug. 5, 1908, *N. F. Petersen*, 2 (US); high open woods, Spearfish Canyon, Aug. 7, 1908, *N. F. Petersen*, 3 (US); Iron Creek, Aug. 7, 1908 (no. 3, 3a[1]), Aug. 14, 1908 (no. 3) *N. F. Petersen* (US);

Black Hills, *W. H. Forwood*, 1447 (G); Deadwood to Sturgis Rd., T. 4 N. R. 3 E., Aug. 26, 1910, *J. Murdock*, 4325 (G); high hillsides, Deadwood, July 31, 1913, *W. P. Carr*, 140 (G, NY, US); Deadwood, 1926, *H. E. Hayward*, 263 (NY); Nemo, 1912, *S. S. Visher*, 1560 (NY). CUSTER CO.: Custer, Black Hills (alt. 5500′) Aug. 1, 1892, *P. A. Rydberg*, 753 (G, NY, US); Custer, Aug. 21, 1908, *N. F. Petersen*, 4 (US). SASKATCHEWAN. Without stated locality: *Palliser's Br. N. Amer. Exped.*, 1857–8, *E. Bourgeau* (G); Exact region undetermined: open prairies, near Hazel, July 11, 1906, *J. M. Macoun & W. Herriot*, 69885 (NY, US, Ot); prairies, bare hills (G. T. P. Rwy.), July 31, 1906, *J. M. Macoun & W. Herriot*, 69888 (NY, US, Ot); Round Valley Lake (G. T. P. Rwy.), Aug. 7, 1906, *J. M. Macoun & W. Herriot*, 69889 (NY, US, Ot); prairies, 10 mis. w. of Round Valley Lake, Aug. 8, 1906, *J. M. Macoun & W. Herriot*, 69890 (US, Ot); dry gravelly soil, Old Wives Creek, July 25, 1880, *J. M. Macoun*, 72719 (Ot). 72 P 9: 30 mis. s. of Touchwood, July 18, 1906, *J. M. Macoun & W. Herriot*, 69886 (NY, Ot); borders of marshes, Touchwood Hills, Aug. 11, 1872, *J. M. Macoun*, 9856 (Ot). 73 B 2: prairies w. of Saskatoon, July 29, 1906, *J. M. Macoun & W. Herriot*, 69887 (NY, US, Ot); 73 C 12–13: prairies, fresh water lake, e. of Lake Manito, Aug. 8, 1906, *J. M. Macoun & W. Herriot*, 69891 (NY, US, Ot); prairies, Lake Manito (G. T. P. Rwy.), Aug. 9, 1906, *J. M. Macoun & W. Herriot*, 69892 (NY, US, Ot). 73 D 15–16: Ribstone Creek (G. T. P. Rwy.), Aug. 11, 1906, *J. M. Macoun & W. Herriot*, 69893 (NY, US, Ot); prairies, Ribstone Creek (G. T. P. Rwy.), Aug. 11, 1906, *J. M. Macoun & W. Herriot*, 69894 (NY, US, Ot); prairies, Ribstone Creek (G. T. P. Rwy.), Aug. 12, 1906, *J. M. Macoun & W. Herriot*, 69895 (G, NY, US, Ot); prairies, Ribstone Creek (G. T. P. Rwy.), Aug. 14, 1906, *J. M. Macoun & W. Herriot*, 69897 (NY, US, Ot); 73 H 4: sandhills, n. of Prince Albert, July 13, 1896, *J. M. Macoun*, 12749 (Ot); open sandy woodlands, Prince Albert, Aug. 15, 1913, *F. W. Johnson*, 1417 (US). 62 E 5: Weyburn prairie, *A. B. Sanson*, 135 (NY). 62 L 12: Indian Head, Aug. 14, 1895, *W. Spreadborough*, 10830 (Ot). 62 M 1: Yorkton, Aug. 19, 1908, *W. Crawford* (Q). 72 I 6: prairies, Thunder Creek, Moose Jaw, Aug. 27, 1895, *W. Spreadborough*, 10831 (Ot). ALBERTA. 83 H 11: dry prairie, edge of brush, Fort Saskatchewan, Aug. 15, 1935, *G. H. Turner*, 36 (G, NY); prairies, w. side of Beaver Hills, Aug. 23, 1906, *J. M. Macoun & W. Herriot*, 69898 (G, NY, US, Ot). 83 H 12: dry prairies, vicinity of Edmonton, Aug. 3, 1908, *W. C. McCalla*, 2527 (Ot). 83 A 4: prairie, Red Deer, Aug. 1895, *H. M. Gaetz*, 10832 (Ot). MONTANA. SHERIDAN CO.: Westby, Aug. 9, 1928, *Miss E. Larsen*, 204 (US). WYOMING. CROOK CO.: sandy pine woods, 6 mis. n. w. of Hulett, Sept. 14, 1937, *M. Owenby*, 1509

(NY); open woods, Black Hills, July 23, 1910, *A. Nelson*, 9496 (G, NY, US); Devil's Tower, Aug. 9, 1897, *L. W. Carter* (US); Bear Lodge Mts., near Sundance, Aug. 9, 1897, *L. W. Carter* (US). Albany Co.: Laramie Peak, Aug. 8, 1895, *A. Nelson*, 1651 (G, NY, US, isotypes); meadows, Bacon's Ranch, Aug. 15, 1903, *A. Nelson*, 8925 (G, NY, US). COLORADO. Co. undetermined: between Arkansas and South Platte River, July 29, 1883, *R. W. Woodward* (G); Coyote Creek, Aug. 29, 1883, *B. H. Smith* (P); Arkansas Valley, *Lieut. Wheeler's Expedition*, 1873, *J. Wolf & J. T. Rothrock*, 458 (G, US); latitude 39–41, 1862, *Hall & Harbour* (G); Colorado Terr. (latitude 39–41), 1864, *C. C. Parry* (O, US). Larimer Co.: foot of Longs Peak, 1862, *C. C. Parry* (G); Estes Park, Aug. 20, 1864, *C. C. Parry* (G); mountains (alt. 7500′), Aug. 19, 1895, *C. S. Crandall* (NY). Routt Co.: Trout Creek, 1873, *J. Wolf*, 458 (NY). Adams Co.: Denver, Aug. 1873, *J. M. Coulter* (P, US). Arapahoe Co.: South Park, 1871, *W. M. Canby* (G). Boulder Co.: Sugar Loaf Mt. (alt. 8000′), 1902, *F. Tweedy*, 4935 (NY); Jefferson Co.: rocky hillsides, Aug. 30, 1888, *N. G. Smith* (US). Mesa Co.: Bridge Pass, 1856, *H. Engelmann* (G). El Paso Co.: near Manitou, 1899, *Mrs. C. N. S. Horner* (G); Palmer Lake, 1896, *Miss Hughes*, 9 (G). Gunnison Co.: rich meadows, Parlin (alt. 8000′), Aug. 20, 1901, *B. H. Smith*, 110 (NY, P); Jack's Cabin, region of Gunnison watershed, July 26, 1901, *C. F. Baker*, 610 (NY, US (ND type of *Laciniaria formosa* Greene)); Irwin Lakes, 1896, *F. Clements*, 378 (NY). Custer Co.: West Cliffe, 1896, *C. L. Shear*, 3459 (NY). Huerfano Co.: La Veta, 1896, *C. L. Shear*, 3561 (NY). Alamosa Co.: Alamosa, 1896, *F. Clements* 122 (NY). Archuleta Co.: Pagosa Springs, Aug. 19, 1893, *B. H. Smith* (P), Aug. 30, 1899, *C. F. Baker*, 691 (G, NY, US); grassy meadow near Dyke, Aug. 11, 1937, *Marion Ownbey*, 1430 (NY). NEW MEXICO. Co. undetermined: Sierra Grande, Aug. 15, 1903, *A. H. Howell*, 212 (US). Colfax Co.: marshy hillside, vicinity of Ute Park, (alt. 2200–2900 m.), Sept. 6, 1916, *P. C. Standley*, 14397 (G, NY, US); clay & shale in oak-pine woods, top of Raton Pass (alt. 7800′), Aug. 6, 1941, *U. T. Waterfall*, 3186 (G). San Miguel Co.: Rociada, 1905, *J. E. Dandelin* (G).

The description of *Laciniaria ligulistylis* differentiated this species clearly from other western ones. However, since Nelson described the leaves as being glabrous, subsequent writers in referring to plants of the northern mid-west region have distinguished from this species similar plants that had pubescent leaves, as Rydberg in *L. Rosendahlii* and Lunell in the numerous varieties of *Laciniaria scariosa* cited above: When describing

the plants of that species from North Dakota, Lunell (Amer. Mid. Nat. ii. 90 (1911)) stated generally: "The leaves . . . sometimes glabrate, but never perfectly glabrous" and again: "The Rocky Mountain forms as described by Prof. Aven Nelson (*Liatris ligulistylis*) are single-stemmed with glabrous leaves, else they appear in general characters to be near relatives of our plants". Dr. Nelson has kindly examined for the writer specimens received from Saskatchewan of which the leaves had not only a ciliate margin but also some pubescence. These he identified as *L. ligulistylis* and in correspondence he stated: "I find that I have placed three of Lunell's specimens under *L. ligulistylis*. He distributed them as varieties of *L. scariosa*. I am wondering if these three may not have been included in Dr. Rydberg's *L. Rosendahlii*. I see no sufficient reason for keeping of any of these out of *L. ligulistylis*". The discovery that the corolla-tube of *Liatris ligulistylis* lacks any pilosity within, as does the type specimen of *L. Rosendahlii* Rydb. (*C. O. Rosendahl*, no. 3699, Itasca State Park, Minn. (M)) has given a fine test-character to accompany determinations, especially as all other members of the *Scariosae* series do have hairs in the corolla-tube near the base of the filaments.

Examination of the type specimens of Lunell's varieties of *Laciniaria scariosa* kindly loaned me by Prof. Rosendahl of the University of Minnesota, has made it seem advisable to add to the synonymy of *L. ligulistylis* many of those varieties. Most of them were based on variations of leaf-shape and -arrangement, but excepting the character of pubecsent leaves, were said by Lunell to be "near relatives" of *L. ligulistylis*. On examination of the corolla-tubes, 19 of the type specimens of Lunell's varieties from North Dakota and Minnesota were found to have no hairs within, and by other leaf-, head- and phyllary-characters to fall correctly under *L. ligulistylis*. These are found in the list of synonyms. Eight of the others (varieties *brachiata*, *Chandonnetii nictitans*, *praecellens*, *propinqua*, *ramea*, *superans* and *superscandens*) showed some pilosity and other characters giving evidence that they are intermediates between this species and *L. aspera*.

Although the type specimen of Sheldon's *Laciniaria scariosa* var. *corymbulosa* (*Leiberg*, no. 27 from Mankato, Blue Earth Co., Minn. (M)) has unfortunately not been located, from the splendid

plate given of it (Bull. Geol. & Nat. Hist. Surv. Minn. ix. 77. t. 6 (1894)) when raising it from formal to varietal rank, and from the examination of two of three specimens then cited (Aug. 1891, *E. P. Sheldon*, nos. 1270 and 1364 from Lakes Benton and Verdi respectively, Lincoln Co., Minn. (M)) which proved to be *L. ligulistylis* (Nels.) K. Sch., we are here including it in the synonymy of that species. However, one specimen cited (Aug. 1891, *E. P. Sheldon*, no. 1586 from Lake Benton, Lincoln Co., Minn. (M)) proved to be an intermediate, as are the specimens of Aug. 16, 1901, *L. R. Waldron* and *T. F. Manns* from the vicinity of Fargo, N. Dak. (G, US). Successful hybridization between these two species has resulted in a wide variety of combinations of parental characters too inconstant to be typified in one hybrid description, yet easily recognizable (see no. 18).

In the description of *Liatris Haywardii* Rydb. (Brittonia i. 99 (1931)) from South Dakota there seems to be a close parallelism to *L. Rosendahlii* and *L. ligulistylis* in the size of the corm, leaves, bracts, achene and pappus. The outer phyllaries were described as elliptical and erose on the margin and the inner ones oblong. Rydberg has stated that it differed from *L. aspera* "in the big heads often 2 cm. broad, and in the outer bracts which are twice as long as broad". Examination of the type specimen (*H. E. Hayward*, no. 166, Spearfish Canyon, Lawrence Co., South Dakota, (NY)) showed that the leaves were hirsute on the upper and lower surfaces, and the long phyllaries were loose and erect, as in the involucre of *L. ligulistylis*. By comparison of the flowers it was found that Hayward's plant, as well as that of Miss Pratt (no. 153, from the Black Hills, South Dakota (NY)), also mentioned by Rydberg, lacked pilosity inside the corolla-tube and this gave further confirmation of the relationship to *L. ligulistylis*. Thus again, as in *L. aspera* (see no. 18), there seems to be a range of plants varying in all degrees of pubescence from glabrous to quite hirsute, but always roughened by the cilia on the margin and without any clear-cut geographical limits, so that they can hardly be sharply separated into two varieties, as in that species, and it has seemed best to place them all under one species, *L. ligulistylis*. Sometimes plants are less robust and the heads do not acquire the usual size or there are other features of aberrancy. Such a specimen was described as *Liatris Herrickii* Rydb. (Brittonia, i. 99 (1931)).

An interspecific hybrid of *L. ligulistylis* and *L. punctata*, × *L. fallacior* (Lunell) Rydb., will be discussed under *L. punctata* (see no. 24) but one of less certain parentage is here included.

× Liatris **Nieuwlandii** (Lunell), stat. nov. Stems stiff, 6–10 dm. tall, glabrous or sparingly pubescent below and quite pubescent above or densely pubescent throughout; leaves sometimes glabrous or quite pubescent on lower surface and sparingly so above, usually with a rough margin; basal ones broadly lanceolate, 8–10 cm. long, gradually reduced upwards: inflorescence of few (9–20), sometimes of more numerous, large, sessile or pedicellate heads of 40–70 flowers; phyllaries erect, herbaceous, somewhat cinereous, mostly green to the margins though sometimes quite purplish in color, broadly obovate or somewhat spatulate, almost non-petaloid or with but narrow petaloid or finely ciliolate margins; corolla 9–11 mm. long, generally non-pilose within the tube, though sometimes with scattered hairs; pappus 8–10 mm. long; achene 5–6 mm. long.—*Laciniaria scariosa* var. *Nieuwlandii* Lunell (including f. *versicolor*, f. *gracillima* and f. *borealis* (= f. *septentrionalis* ibid. p. 264)) and var. *praesignis* Lunell, Amer. Mid. Nat. ii. 169–177 (1912). *Liatris novaeangliae* var. *Nieuwlandii* (Lunell) Shinners, Amer. Mid. Nat. xxix. 31 (1943) including f. *alba* Shinners, ibid.

From Michigan and Wisconsin southward into Ohio, Indiana, Illinois and Missouri.—MICHIGAN. Without stated locality: *Dr. Crossman* (G). Crawford Co.: sandy jack-pine plains, 6¾ mis. n. n. w. of Grayling, Sept. 14, 1935, *F. J. Hermann*, 7324 (US); vicinity of Grayling, July 122, *C. V. Piper* (US). Grand Traverse Co.: Boardman Plains, Sept. 2, 1919, *W. L. McAtee*, 3114 (US). Lapeer Co.: s. side of Lapeer, Aug. 17, 1911, *C. K. Dodge* (US 690400-1-2). Ingham Co.: college grounds, Agric. College, Sept. 20, 1890, *C. F. Wheeler* (US 63528). Wayne Co. 7 Mile Road, Detroit, Nov. 13, 1911, *J. A. Nieuwland*, 1680 (ND type of *Laciniaria scariosa* (L.) Hill var. *Nieuwlandii* f. *septentrionalis* Lunell). Washtenaw Co.: Ypsilanti, Sept. 26, 1857, *W. Boott* (G); steep grassy bank, 2.3 mis. n. e. of Ann Arbor, Sept. 5, 1937, *E. J. Hermann*, 9196 (NY). OHIO. Erie Co.: Castalia Prairie, Sept. 19, 1909, *E. L. Moseley* (US), Lucas Co.: near Toledo, Aug. 1879, *J. A. Sanford*, 1176 (NY). Stark Co.: Canton South Swamp, Sept. 1, 1912, *Mrs. Case* (G). Franklin Co.: Columbus, *W. S.*, 64 (G). INDIANA. Steuben Co.: in a prairie condition, ½ mi. n. of Clear Lake, Aug. 21, 1904, *C. C. Deam* (M, type of *Laciniaria scariosa* (L.) Hill var. *Nieuwlandii f. versicolor* Lunell) ((G, 12 sheets) NY); Sept. 11, 1904 (M, type of *Laciniaria scariosa* (L.) Hill var. *Nieuwlandii f. gracillima* Lunell) ((G, 2 sheets) NY); without stated locality, Aug. 21, 1904, *C. C. Deam* (US 494351); in sandy woods, near

Cedar Lake, Sept. 9, 1903, *C. C. Deam* (US 440343); without stated locality, Sept. 11, 1904, *C. C. Deam* (US 494350); gravelly roadside, on the e. side of Tamarack Lake, Aug. 19, 1916, *C. C. Deam*, 20918 (US); n. e. of Clear Lake, Aug. 18, 1916, *C. C. Deam*, 20900 (US); e. of Hog Bog Lake, *C. C. Deam*, 20934 (US). La Grange Co.: on high bank of Pigeon R., 2 mis. e. of Ontario, Aug. 30, 1914, *C. C. Deam*, 15075 (US). Porter Co.: sandy soil along Erie Rwy. just w. of Kouts, Sept. 12, 1942, *R. C. Friesner*, 17471 (G). Noble Co.: dry white-black oak woods, 1½ mis. s. w. of Rome City, Aug. 26, 1914, *C. C. Deam*, 14776 (G, US). Kosciusko Co.: in a gravel pit, n. side of Winona Assembly Grounds, Aug. 17, 1906, *C. C. Deam*, 1496 (G); in sandy woods, w. side of Pike Lake, near Warsaw, Aug. 17, 1906, *C. C. Deam*, 1524 (NY, US); w. side of Pike Lake, Sept. 16, 1906, *C. C. Deam* (US). Marshall Co.: outlet of Lake Maxinkuckee, Sept. 5, 1909, *H. W. Clark* (US). Allen Co.: prairie, ¾ mi. s. of Fort Wayne, Aug. 19, 1900, *C. C. Deam* (M, type of *Laciniaria scariosa* (L.) Hill var. *Nieuwlandii* Lunell). Cass Co.: sandy prairie patches along rwy. ½ mi. e. of L. Cicott, Sept. 26, 1936, *R. Friesner*, 10136 (NY). Warren Co.: stone bluffs of Pine Creek, 2 mis. above Mudlavia, Sept. 11, 1911, *C. C. Deam*, 9986 (M, type of *Laciniaria scariosa* (L.) Hill var. *praesignis* Lunell). WISCONSIN. Walworth Co.: Lauderdale Lakes, Aug. 1890. *M. S. Bebb* (G): without stated locality, 1872, *M. S. Bebb* (US). Rock Co.: oak openings along the Chicago N. W. Rwy., Clinton, Sept. 1, 1909, *E. S. Steele*, 97a (G, US) 97b (G, US) 97c, 97d (US). ILLINOIS. Cook Co.: pebbly clay of Valparaioso moraine, vicinity of Palos Park, Sept. 6–7, 1909, *E. S. Steele*, 134a (G) 135 (G, US) 135c (G, US); dry hills, Palos Park, Sept. 6, 1900, *L. M. Umbach* (US); thickets, Palos Park, Sept. 17, 1907, *L. M. Umbach*, 2119 (US). Hancock Co.: Augusta, Aug. 1844, *S. B. Mead* (NY). Menard Co.: without stated locality, Aug. 1872, *M. M. Milligan* (US). MISSOURI. Pike Co.: McCune, Aug. 28, 1915, *J. Davis*, 249 (US).

(*To be continued*)

A Second Station for Corydalis flavula in Connecticut.—*Corydalis flavula* (syn. *Capnoides flavulum*) is not recorded in Gray's Manual, 7th Edition, or in Britton & Brown's Illustrated Flora, 2nd Edition, as found in New England. In 1925 Mr. Hugh S. Clark of Lancaster, Massachusetts, then a student at Wesleyan, found the plant on a stony ledge on Higby Mountain, a trap ridge in the western part of Middletown and Middlefield, Connecticut. He recorded the find in a note published in

RHODORA, **28**: 68. The present writer was for a number of years active in trail work on Higby Mountain and other trap ridges in central Connecticut, and as an amateur botanist became fairly familiar with the plants on them. In or about 1932, while working on the Mattabessett Trail on Lamentation Mountain, which is the next ridge north of Higby Mountain and which lies partly in the towns of Meriden, Berlin, and Middletown, but chiefly in Meriden, he discovered a specimen of the plant. This fact was noted in his flower-book and mentioned to Mr. Arthur E. Blewitt of Waterbury, Connecticut. Subsequent search for the plant was unsuccessful until April 28, 1946, when it was rediscovered by the writer when on a hike of the Connecticut Chapter of the Appalachian Mountain Club. It was found in several places, but especially in a large patch near the south end of the main ridge at an elevation of about 720 ft. Unlike *C. sempervirens*, which grows on and about exposed ledges and blossoms all summer and which grows in this same area, *C. flavula* is found in rich leaf-mold in the woods, which grow quite close to the edge of the escarpment. The plant is weak and sprawling and its blossoming period is from April into June. As its name indicates, the flowers are pale yellow. The species is only sparingly found in New York State. The counties listed for it in House's Annotated List of the Ferns and Flowering Plants of New York State are Ulster, Dutchess, Orange, Westchester, and Rockland. It has also been found on Manhasset Neck, Long Island.—FREDERICK W. KILBOURNE, Cheshire, Connecticut.

DOES BARTONIA VERNA GROW IN VIRGINIA?—In 1803 Michaux described and illustrated his CENTAURELLA VERNA Michx. Fl. Bor.-Am. i. 98, t. 12, fig. 2 (1803), from sphagnous habitats in South Carolina (in sphagnosis Carolinae inferioris). In 1814 Pursh, Fl. Am. Sept. i. 99 (1814), changed the name to *C. vernalis* and on p. 100 described *C. vernalis* β. *uniflora* "caule unifloro", giving for the two plants the range "In mossy swamps: Virginia to Georgia. ⊙ May–July . . . Var. β. *v. s.* in *Herb. Lyon.*" *Bartonia verna* (Michx.) Muhl., based on *Centaurella verna* Michx., has subsequently been regularly treated as coming north into Virginia. Nevertheless, painstaking search (always with

this "spook" in mind) through 14 seasons in hundreds of proper habitats in southeastern Virginia has failed to bring the plant to light, although *B. virginica* (L.) BSP. is there abundant and the often larger-flowered *B. paniculata* (Michx.) Muhl. especially so. In the Gray Herbarium the most northern definite station represented for *B. verna* is Wilmington in southeastern North Carolina. The flowering dates on the labels of *B. verna* range from December 26 (Florida) to April 3 (South Carolina), which would lead one to expect it in southeastern Virginia in late March and April. Small says "Winter–spring".

It is, consequently, significant that Pursh said for his *Centaurella vernalis* "May–July" and that he did not differentiate the very characteristic *C. paniculata* Michx. (*Bartonia paniculata* (Michx.) Muhl.) from *B. virginica* (L.) BSP. (*Sagina virginica* L., *Bartonia tenella* Muhl.), Pursh merging these two species as his *Centaurella autumnalis*. In view of the abundance "In mossy swamps" of southeastern Virginia of *Bartonia paniculata* and *B. virginica*, which begin flowering in July, it seems not improbable that Pursh's "July" and his Virginia record were not based on actual *B. verna*. If any actual evidence of the truly vernal *B. verna* in Virginia exists I shall welcome the information.—M. L. Fernald.

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THE NEW ENGLAND BOTANICAL CLUB

Vol. 48 November, 1946. No. 575.

VEGETATION OF ARTIFICIAL LAKES IN NORTHWESTERN ARKANSAS

J. B. Moyle, E. L. Nielsen and O. R. Younge[1]

During recent years several artificial lakes or water reservoirs have been created in northwestern Arkansas. Aquatic and marsh vegetation has rapidly invaded these newly flooded areas which were formerly farm and forest land. In 1939, extensive collecting was done at four of these reservoirs to determine the nature and extent of natural revegetation. The reservoirs considered include Lake Wedington, near Fayetteville in Washington County; Lake Atalanta, near Rogers in Benton County; the reservoir at Cave Springs in Benton County and that in Devil's Den State Park, Washington County. Lake Wedington and Lake Atalanta each cover about 80 acres and have a maximum depth of about 40 feet. The reservoirs at Cave Springs and Devil's Den have areas of about 3 and 5 acres, respectively, and a depth of about 15 feet.

Two years after Lake Wedington began to fill, 39 species of aquatic and wet soil plants had established themselves. The commonest submerged species were *Chara Braunii* Gmel., *Najas guadalupensis* (Spreng.) Morong and *Potamogeton Berchtoldi* Fieber var. *tenuissimus* (Mert. & Koch) Fern. The most com-

[1] Aquatic Biologist, Bureau Fisheries Research, Minnesota Department of Conservation, St. Paul; Associate Agronomist, Division of Forage Crops and Diseases, U. S. Department of Agriculture, Soils and Agricultural Engineering, Madison, Wis. and Lancaster, Ky., respectively. The collections were made by Nielsen and Younge and the specific determinations by Moyle. Specimens are deposited in the Herbarium of the University of Minnesota.

mon shoreline species was *Eleocharis obtusa* (Willd.) Schult. Other species collected include *Typha latifolia* L., *Potamogeton nodosus* Poiret, *P. natans* L., *Alisma Plantago-aquatica* L., *Lophotocarpus calycinus* (Engelm.) J. G. Smith, *Sagittaria ambigua* J. G. Smith, *S. graminea* Michx., *S. latifolia* Willd., *S. rigida* Pursh, *Anacharis occidentalis* (Pursh) Victorin, *Eragrostis hypnoides* (Lam.) BSP., *Echinochloa pungens* (Poiret) Rydberg, *E. colonum* (L.) Link, *Leersia oryzoides* (L.) Swartz, *Carex gynandra* Schwein., *Cyperus acuminatus* Torr. & Hook., *C. esculentus* L., *C. ovularis* (Michx.) Torr., *C. odoratus* L., *Commelina hirtella* Vahl, *Juncus diffusissimus* Buckley, *J. effusus* L., *J. interior* Wiegand, *J. nodatus* Coville, *Polygonum coccineum* Muhl., *P. Persicaria* L., *P. punctatum* Ell., *Ceratophyllum demersum* L., *Nelumbo pentapetala* Walt., *Ludwigia alternifolia* L., *Nymphoides peltatum* (Gmel.) Britten & Rendle, *Heliotropium indicum* L., *Lindernia anagallidea* (Michx.) Pennell, *Utricularia biflora* Lam. and *Bidens frondosa* L.

A year after the filling of Lake Atalanta the following six species of aquatic and shoreline plants were present: *Potamogeton foliosus* Raf. var. *genuinus* Fern., *Kyllinga pumila* Michx., *Cyperus esculentus* L., *C. strigosus* L. *Leersia oryzoides* (L.) Swartz and *Nasturtium officinale* R. Br. The Devil's Den reservoir, two years after filling, had a sparse flora of *Chara* sp. and *Juncus effusus* L. The exact age of the reservoir at Cave Springs, which is somewhat older, was not ascertained. Eight species were collected here. These included *Chara fragilis* Desvaux, *Typha latifolia* L., *Potamogeton foliosus* Raf. var. *genuinus* Fern, *Leersia oryzoides* (L.) Swartz, *Cyperus strigosus* L., *Scirpus pallidus* (Britton) Fern., *Lycopus rubellus* Moench and *Mentha canadensis* L.

Senecio tomentosus Michx., forma **alabamensis** (Britton) stat. nov. *S. alabamensis* Britton ex Small, Fl. Se. U. S. 1305 (1903).

Several collections from eastern Virginia, such as *Grimes*, no. 3552 from James City County, *Heller*, no. 850 from Isle of Wight County, and *Fernald & Moore*, nos. 15,162 and 15,163 from Nansemond County, show that *S. alabamensis* is at best an extreme glabrous or glabrescent form of the generally tomentose

S. tomentosus. Its stout caudex, coarse fistulous and soon very brittle and fractured stems, its leaf-outline and toothing, inflorescence, and hirtellous columnar achenes are inseparable from those of the much commoner typical *S. tomentosus*.—M. L. Fernald.

THE GENUS LIATRIS

L. O. Gaiser

(*Continued from page 263*)

With *L. ligulistylis* (Nels.) K. Sch. abundant in the prairie provinces and the states immediately adjacent (Wisconsin, Minnesota, North and South Dakota) and thence southwestward through Wyoming, Colorado and northern New Mexico, there are found in Michigan, Illinois, Indiana and Ohio, (a geographically central region for the series *Scariosae*), what may be intermediates between *L. ligulistylis* and another species. Lunell described *Laciniaria scariosa* var. *Nieuwlandii* as having stem not unusually 1 m. high, simple or even branched (then with few-headed branches), with a few-headed, short-pedicelled, narrow short inflorescence to ample many-headed, long-pedicelled or long-branched one with an ample green foliage . . . involucral bracts bright green over the whole surface or with narrow almost entire purple margins. Examination of the type showed a striking similarity in the nine large heads to a robust form of *L. ligulistylis* with herbaceous phyllaries. That modifications of the type are easily found was recognized by Lunell since he described 3 forms: f. *borealis* (renamed *septentrionalis* (Amer. Mid. Nat. ii. 264 (1912)), f. *versicolor* and f. *gracillima*. In the note regarding f. *borealis*, Lunell made this remark: the "short stem and short, few-headed raceme bespeak its northern origin". The type of forma *borealis* Nov. 13, 1911, *J. H. Nieuwland*, no. 1680, from 7 Mile Road, Detroit, Michigan (N. D.) has 10 heads, and a few buds, with erect, suborbicular, only slightly scarious-margined phyllaries, and again resembles *L. ligulistylis* in general habit, though the leaves are numerous and linear-lanceolate, suggesting possibly a blending with *L. borealis* of the New England States. Other specimens seen have given a similar suggestion, as *Dr. Crossman*, without locality, Michigan (G). However,

mostly the specimens, especially those from Michigan, have broadly lanceolate basal leaves and large few-headed inflorescences with erect phyllaries that at least associate them with *L. ligulistylis*. We regard them as a hybrid of *L. ligulistylis* and possibly *L. borealis*. Examination of the corolla-tubes of the type specimens of all three *formae* showed occasional hairs inside rather than the very definite non-pilose condition in *L. ligulistylis* and thus too gave evidence of hybridity.

In the two complete plants on the type sheet of Lunell's *Laciniaria scariosa* var. *praesignis* (of C. C. Deam, no. 9986, from stone bluffs of Pine Creek above Mudlavia, Warren Co., Ind. (M)) there seem to be clearly combined the leaf-characters and few heads in an almost strict spike of *L. ligulistylis* with erect phyllaries having finely ciliolate margins and though they appear to be somewhat depauperate specimens we place this variety here in synonymy. A third incomplete plant on the sheet with an inflorescence of more numerous (19) heads, having phyllaries that are pubescent on the surface could be an intermediate of *L. scabra* and *L. aspera* (see no. 19).

21. LIATRIS BOREALIS Nutt. ex MacNab. Stem glabrous or sparingly pubescent with appressed hairs, somewhat striate, 4–6 dm. high from a rounded corm up to 5 cm. in diameter: leaves numerous, often twisted, glabrous or with sparse distribution of hairs along the midrib beneath or on the lower surface and ciliate along the margin, the basal lanceolate, 1–1.5 dm. long and 1 cm. wide, merely narrowed to a clasping base, hardly petiolate; upper cauline leaves numerous, linear-lanceolate, sessile, gradually reduced in length to bracts 2–3 cm. long, subtending the flower-heads: inflorescence with rachis pubescent, 1–3 dm. long, of 5–30 short- or longer-pedicelled heads, of 35–60 flowers, broadly campanulate to hemispherical in form because of the loosely appressed but erect, non-recurved, rounded to oblong phyllaries; basal herbaceous outer phyllaries ovate to rounded, sometimes slightly pubescent like the pedicels, with ciliolate, rarely colored margins; middle and inner phyllaries rounded to linear, thinner, often marginally colored, though varying from narrowly to hardly at all petaloid, with a finely ciliolate margin (where the phyllaries are more petaloid the fine ciliolae practically disappear); corolla purple, rarely white, tube scantily pilose within, 9–10 mm. long; pappus ca. 8 mm. long; achene 6–7 mm. long.—*L. borealis* Nutt. ex MacNab, Edinb. New Phil. Jour. xix. 60 (1835). *L. scariosa* β *intermedia* Ell. Sk. ii. 281 (1824). *L. scariosa* of Edwards, Bot. Reg. t. 590 (1821) and Lindley, Bot.

Reg. t. 156 (1835), not (L.) Willd. *Liatris squarrosa* sensu Sweet, Br. Fl. Gard. t. 44 (1824), not (L.) Willd. *Laciniaria scariosa* var. *novae-angliae* Lunell, Amer. Mid. Nat. ii. 172, 177 (1912). *Liatris novae-angliae* (Lunell) Shinners, Amer. Mid. Nat. xxix. 29 (1943). *L. novae-angliae f. albiflora* Shinners, Amer. Mid. Nat. xxix. 29 (1943).

Southwestern Maine to Pennsylvania.—MAINE. Without stated locality, Aug. 21, 1927, *E. E. Perkins* (US). York Co.: North Berwick, Sept. 5, 1891, *J. C. Parlin* (G). NEW HAMPSHIRE. Without stated locality, Aug.–Sept., *Little* (P). MASSACHUSETTS. Essex Co.: Ipswich, *Oakes* (G, NY, P); in the fields, Ipswich, 1816, *Dr. Boott*, 1353 (US); Salem, *Nuttall* (P, type); roadside, Boxford, Sept. 2, 1887, *G. G. Kennedy* (G, P); Boxford, Aug. 1893, *F. H. Peabody* (G); Boxford (albino), Sept. 10, 1909, *A. L. Page* (G). Middlesex Co.: Tewksbury, Sept. 24, 1899, *E. F. Williams*, 2 (G); Westford, *E. F. Fletcher* (G); Concord, Aug. 30, 1888, *C. E. Faxon* (G); old graveyard, Malden, *C. E. Faxon* (G). Worcester Co.: border of Wachusett Reservoir, Boylston, 1930, *E. W. Bemis* (G); Rutland, Sept. 6, 1926, *R. H. Piper*, 283 (O). Franklin Co.: New Salem, Aug. 21, 1929, *A. S. Goodale, W. Markert & R. H. Piper*, 55731 (G). Norfolk Co.: Dedham, Islington Junction, Aug. 22, 1897, *E. F. Williams*, 1 (G). Hampshire Co.: Prescott, Aug. 26, 1929, *R. H. Piper*, 517 (O). Hampden Co.: sparsely wooded, sandy plain, Southwick, Sept. 14, 1914, *F. C. Seymour*, 279 (NY). Barnstable Co.: dry, sandy field, s. of Blueberry Pond, Brewster, Sept. 12, 1927, *M. L. Fernald*, 490 (G, NY, P, O); dry soil, near mouth of Red River, Harwich, Aug. 25, 1918, *M. L. Fernald & B. Long*, 17455 (G, P); dry argillaceous fields, n. of No Bottom Pond, Brewster, Sept. 7, 1918, *M. L. Fernald & B. Long*, 17456 (G, NY, P); Chatham, *M. L. Fernald & B. Long*, 19175, 10505 (P); Quissett Harbour, Sept. 6, 1923, *M. L. Fernald, B. Long & J. M. Fogg* (P), Sept. 20, 1918, *M. L. Fernald & C. A. Weatherby*, 17457 (G); Oyster Pond, Falmouth, *F. W. Pennell*, 3497 (P); s. w. of Barnstable, Sept. 16–17, 1916, *R. C. Bean, F. W. Bird & C. H. Knowlton* (P); North Falmouth, *F. W. Pennell, L. A. Kenoyer*, 3466 (P); dry soil, W. Falmouth, Aug. 27, 1906, *J. A. Cushman* (Q); Hyannis Point, Sept. 5, 1898, *J. M. Greenman*, 441 (G). Plymouth Co.: sandy woods and thickets, near Rickard's Pond, Carver, Aug. 30, 1913, *M. L. Fernald, F. W. Hunnewell & B. Long*, 10503 (G, P); Plymouth, Sept. 17, 1889, *J. H. Redfied* (P), *Mr. Gilbert* (G); Marion, Sept. 1888, *Miss A. M. Vail* (NY); Brockton, Sept. 27, 1901, *C. B. Blomberg* (US). Nantucket Co.: Wauwinet, Sept. 8, 1894, *E. F. Williams* (P); moorland, *F. W. Pennell*, 11002 (P); dry roadside, Sept. 4, 1913, *Miss E. M. Moody* (G); roadsides, Aug. 30, 1897, *Miss F. N. Vasey* (US); without stated locality, Sept. 14, 1899, *E. P. Bicknell*

(NY). DUKE Co.: Chappaquiddick Isl., Aug. 1898, *A. Hollick* (G, NY). RHODE ISLAND. PROVIDENCE Co.: Cumberland (Manville), 1880, *G. Hunt & W. W. Bailey*, 175 (US); Warwick Twsp., Sept. 5, 1875, *Amer. Mus. Nat. Hist.* (NY). KENT Co.: Johnston Twsp., Aug. 8, 1878, *G. C. Capron* (NY); Coventry, Aug. 1895, *J. F. Smith* (US). NEWPORT Co.: dry hillside, near New Shoreham Center, Block Isl., Sept. 15, 1913, *M. L. Fernald, B. Long & G. S. Torrey*, 10506 (G, NY, P); Block Isl., 1916, *Gravatt* (US). CONNECTICUT. WINDHAM Co.: dry gravelly soil, Putnam, Sept. 5, 1908, *C. H. Bissell & C. A. Weatherby* (G). NEW LONDON Co.: sandy soil, s. of Westchester Sta., Colchester, Sept. 23, 1904, *C. B. Graves* (G). NEW HAVEN Co.: dry soil, near coast, Guilford, Sept. 16, 1906, *G. H. Bartlett* (G); Stratford, Sept. 9, 1895, *E. H. Eames* (G); Stratford (albino), Oct. 5, 1927, *E. H. Eames*, 10402 (G); New Haven, Sept., 1874, *A. H. Young*, 23 (ND, type of *Laciniaria scariosa* var. *novae-angliae* Lunell); in sandy waste, near New Haven, Nov. 9, 1879, *J. A. Allen* (P). FAIRFIELD Co.: Fairfield, Sept. 9, 1893, *E. H. Eames* (US). NEW JERSEY. MONMOUTH Co.: Middletown, Sept. 1838, *Torr. & Gray* (G). NEW YORK. Co. undetermined: Long Isl., *J. Torrey* (P). ALBANY Co.: sandy soil, near Londonville, Sept. 15, 1932, *H. D. House*, 20173 (G, NY). QUEENS Co.: Old Mill Yacht Club (albino), Sept. 8, 1940, *H. N. Moldenke*, 11606 (NY). NEW YORK Co.: Harlem River, Sept. 23, 1865, *W. H. Leggett* (NY). SUFFOLK Co.: Greenport, Sept. 1870, *W. G. Farlow* (G); Aquebogue, Sept. 1873, *H. M. Young* (US); in wet pockets, among sand dunes, Easthampton, Long Isl., Aug. 18, 1938, *W. C. Muenscher & O. F. Curtis*, 6603 (G, NY); sandy pine woods, East Islip, Aug. 31, 1938, *W. C. Muenscher & O. F. Curtis*, 6602 (US); near MacKay Radio Sta., Aug. 18, 1938, *W. C. Muenscher & O. F. Curtis*, 6603 (G), 6602 (P). NASSAU Co.: near Flushing, Sept. 17, 1936, *J. Monachino*, 175 (O); Locust Grove, Sept. 3, 1936, *S. A. Cain* (NY). PENNSYLVANIA. CENTRE Co.: dry, rocky, grassy bank in Half Moon Valley, 2 mis. n. of State College, Aug. 18, 1938, *H. A. Wahl*, 226 (G).

MacNab (Edin. New Phil. Jour. xix. 60 (1835)) in publishing *Liatris borealis* stated: "While looking through the herbarium of Nuttall when at Philadelphia, I found that the species was marked *L. borealis* but no description of it has yet been published".

Presumably the type specimen is at the British Museum in London where Nuttall's Herbarium is, but Mr. Weatherby did not find it when obtaining photographs of others of Nuttall's types in the summer of 1939. There is a specimen in the Her-

barium of the Philadelphia Academy of Sciences from Salem, Mass., named *Liatris borealis* in Nuttall's handwriting. The name *borealis* has been crossed out, but Dr. Pennell[1] stated: "the width of the line made, makes me think it was not Nuttall himself". This specimen may then be the type.

The plant in Philadelphia, though incomplete, shows there had been 7 heads on pedicels about equal in length to the one remaining head, 2 cm. long, with generally erect phyllaries. The outer ones are hardly at all scarious, finely ciliolate; the inner linear-oblong ones becoming a little more scarious but still having a fine ciliolate margin. The few remaining cauline leaves are narrowly linear and sessile having a few hairs scattered over the surface.

From MacNab's description, *Liatris borealis* had a simple pubescent stem; ovate-lanceolate, acuminate, long-petiolate radical leaves; stem-leaves sessile, narrowed toward both ends and rough on the margins; outer phyllaries obovate with colored margins; inner ones linear, equal in length to the heads; heads on rather long pedicels, remote, alternating in two rows. "Habitat: dry woods and rocky places throughout the Alleghany mountains". Having omitted mention of the character of the phyllaries in this description, he however adds the note: "This species is readily distinguished from *L. scariosa* (which by some is supposed to be only a variety), by its being very much smoother, having fewer leaves and flowers and reflected bracteas; also by its short styles which scarcely exceed the corolla, whereas in *L. scariosa* the styles are long and the leaves, flowers and bracts are all upright". The phyllaries ("bracteas") of Nuttall's plant from Salem are clearly not reflexed, whereas those of *Liatris scariosa*, as seen in the Linnaean type (see no. 17), certainly are. Paxton, (Paxt. Mag. v. t. 27 (1838)) so briefly described *Liatris borealis*, accompanied by a plate, from a plant cultivated in a nursery at Epsom, Scotland, received in 1836 from the Glasgow Botanical Garden, where it was presumed to have been introduced by Mr. Drummond, that it is not determinative. Torr. & Gray (Fl. N. Am. ii. 75 (1841)) referred *Liatris borealis* of Paxton to *L. scariosa*, and Gray (Synop. Fl. 1^2, 110 (1884)) did the same. I do not find any reference in either work to *L. borealis* MacNab. That

[1] By private communication.

Paxton's plant was identical with Nuttall's is doubtful. His description and accompanying plate seem to be nearer *L. scariosa* var. *typica*, but in any case MacNab's description is earlier and hence must have precedence. Whether MacNab wrote his description from brief notes made on Nuttall's plant or whether there was another plant is not known, but the essential character which he emphasizes in his discussion of *L. borealis*, that differs from the plant we have seen in the Philadelphia Academy, labelled in Nuttall's handwriting, is the reflexed rather than erect phyllaries. The description above embodies the writer's ideas of *Liatris borealis* Nutt. Examination of the type specimen of *Laciniaria scariosa* var. *novae-angliae* Lunell (Amer. Mid. Nat. ii. 172, 177 (1912)) showed it to be the same species as Nuttall's plant from Salem, Mass.

22. Liatris Earlei (Greene) K. Sch. Corm small, subglobose, ca. 2 cm. in diameter: stem usually single, 4–9 dm. high, often somewhat virgate, softly and densely pubescent, or asperous with short white hairs, or even almost glabrous: leaves glabrous, softly pubescent and rough on the margins only, or more rarely scabrous, the basal sharply lanceolate, 10–20 cm. long, 5–15 cm. wide, subpetiolate, narrowing to a short- or longer-winged petiole from one third to one half the length of the blade, the upper rigid, sharp-pointed, narrowly lanceolate or linear, reduced from 6–8 cm. long to narrow bracts less than 1 cm. subtending the heads: inflorescence narrowly racemose, of 20–50 subsessile heads on erect or depressed pedicels about as long as the heads, or more rarely becoming branched and paniculate by the elongation of the pedicels into slender peduncles bearing several heads each; heads of 15–25 flowers, somewhat turbinate or campanulate, 1–1.5 cm. long and ca. 1 cm. wide when flowers are open: phyllaries appressed or sometimes recurved, herbaceous, green and softly pubescent, with ciliolate but almost non-scarious margins; outer phyllaries subovate; middle and inner ones oblong-spatulate, 7–8 mm. long and 2–3 mm. wide, herbaceous and usually finely pubescent, sometimes with purplish ciliolate margin; corolla-tube 7–9 mm. long, scantily to moderately pilose at the base of the tube: mature achene 3–4 mm. long; pappus about 6 mm. long, barbellate.—Just, Bot. Jahresb. xxix[1]. 569 (1903). *Laciniaria Earlei* Greene, Pittonia, iv. 316 (1901). *Laciniaria Tracyi* Alex. ex Small, Man. S. E. Fl. 1335 (1933). *Laciniaria Ruthii* Alex. l. c., not *Lacinaria Ruthii* Bush, Amer. Midl. Nat. xii. 316 (1931). *Liatris squarrulosa* sensu Shinners, Amer. Midl. Nat. xxix. 33 (1943), not Michx.

Occasional from North Carolina to Florida, abundant from

Tennessee to Alabama, and again occasional westward to Indiana, Louisiana and Texas.—NORTH CAROLINA. Co. undetermined: s. slopes of Joanna Bald, Sept. 20, 1900, 22 (NY). Haywood Co.: Waynesville, 1897, *T. G. Harbison* (G). Cherokee Co.: 3–4 mis. e. of Andrews, Sept. 20, 1900, 21 (NY). SOUTH CAROLINA. Beaufort Co.: sandy soil, Sept. 6, 1904, *Biltmore Herb.*, 2670k (US). GEORGIA. Richmond Co.: oakwoods, Augusta, Sept. 25, Oct. 10, 1898, *A. Cuthbert* (NY). FLORIDA. Without stated locality: in rich soil, *Chapman* (G). INDIANA. Harrison Co.: s. slope of Elisabeth Hill, 3 mis. e. of Elisabeth, Oct. 13, 1916, *C. C. Deam*, 22429 (US). KENTUCKY. Logan Co.: rocky hill near Russellville, Sept. 17, 1903, *Biltmore Herb.*, 2670h (US). TENNESSEE. Co. undetermined: Hiwassee Valley, Oct. 1896, *A. Ruth*, 34 (NY, type of *Laciniaria Ruthii* Alex.); sandy ground, Hiwassee Valley, Oct. 1896, *A. Ruth* (US); mts., E. Tennessee, Smoky Range, Sept. 1897, *A. Ruth*, 3767 (NY); dry soil, White Cliff Springs, E. Tennessee, Aug. 1879, *G. Andrews* (US); sandy soil, Higdon, E. Tennessee, Oct. 1895, *A. Ruth* (US). Knox Co.: thickets, Knoxville, June 1897 (no. 3766), Aug. 1896 (no. 36), *A. Ruth* (NY); copses, Knoxville, June 1898, *A. Ruth*, 657 (US); open woods, Knoxville, July 1891, *A. Ruth* (US, 694398); dry woods, 5 mis. from Knoxville, Oct. 5, 1897, *A. Ruth*, 205 (US). Cocke Co.: dry rock banks, Wolf Creek, Sept. 24, 1897, *Biltmore Herb.*, 2670a (G, US). Blount Co.: mountainsides, July 8, 1898, *A. Ruth* 674 (NY). Monroe Co.: 10 mis. n. w. of Tapoco, Sept. 21, 1933, *E. J. Alexander, T. H. Everett & S. D. Pearson* (NY); Tapoco, Sept. 21, 1933, *E. J. Alexander, T. H. Everett & S. D. Pearson* (NY). Grundy Co.: near Monteagle, Sept. 23, 1933, *E. J. Alexander, T. H. Everett & S. D. Pearson* (NY). Polk Co.: near Archville, Sept. 25, 1933, *E. J. Alexander, T. H. Everett & S. D. Pearson* (NY). Hamilton Co.: Lookout Mt., 1878, *G. R. Vasey* (US, 63440). ALABAMA. Madison Co.: on Monte Sano, near Huntsville, Autumn, 1937, *Mrs. N. G. Stevens* (NY). Cullman Co.: without stated locality, Oct. 5, 1901, *Biltmore Herb.*, 2670m (US). Talladega Co.: slopes of Lookout Mt., near Childersburg, Oct. 2, 1899, *Biltmore Herb.*, 9537 (US). Jefferson Co.: dry hills, Avondale, Oct. 9, 1900, *Biltmore Herb.*, 3402 (G, US). Tuscaloosa Co.: dry hills, Tuscaloosa, Oct. 4, 1898, *W. M. Canby*, 67 (G). Greene Co.: chalk prairie, 2 mis. n. w. of Greene, Nov. 5, 1933, *R. M. Harper*, 3137 (G, NY, US). Lee Co.: Auburn, Sept. 27, 1896, *F. S. Earle* (ND, type). Baldwin Co.: Gateswood, Oct. 31, 1903, *S. M. Tracy*, 8558 (G (NY, type of *Laciniaria Tracyi* Alex.) US, ND). Mobile Co.: Mobile, Sept. 24, 1912, *H. H. Bartlett*, 3217 (G, US); mixed woods, s. of Mobile, Sept. 24, 1912; *H. H. Bartlett*, 3223 (US); dry woods, Mobile, Oct. 14, 1898, *C. Mohr* (US);

Mobile, Aug. *C. Mohr* (US); dry pine woods, Mobile, Oct. 20, 1896, *Herb. Geol. Surv. Ala.* (US); pine woods, n. e. of Whistler, Oct. 1919, *E. W. Graves*, 1370 (US); barrens, w. of Spring Hill, Oct. 1918, *E. W. Graves*, 587 (US); sandy scrubby pineland, Hollander's Isl., Sept. 3, 1912, *F. W. Pennell*, 4505 (US). MISSISSIPPI. ATTALA CO.: Ethel, *W. W. McBride* (US). LAUDERDALE CO.: Meridian, Oct. 10, 1896, *C. Schuchert* (US). JACKSON CO.: Ocean Springs, Oct. 17, 1898, *S. M. Tracy* 4871 (US). HARRISON CO.: Biloxi, Aug. 23, 1898, *S. M. Tracy*, 4334 (NY); grassy barrens, near Mississippi City, Sept. 14, 1885, *J. D. Smith*, 425 (US). LOUISIANA. CALCASIEU CO.: Jacksonville, *T. Drummond*, 66 (G). TEXAS. Without stated locality: *C. Wrignt* (G). HARRIS CO.: Houston, Sept. 24, 1937, *G. L. Fisher* (US).

Since *L. squarrulosa* came to be recognized as a variety of *L. scariosa* with small heads, all such specimens were watched for and carefully compared. Though we have found a near match for Michaux's type in H. W. Ravenel's specimens from Santee Canal, S. C. (G), and those of H. H. Bartlett, no. 2420, from pine barrens near Thomson, McDuffie Co., Ga. (G, US), they are nevertheless comparatively rare in herbarium collections.

Greene (Pittonia, iv. 316 (1901)) described a plant collected Sept. 27, 1896, by *F. S. Earle*, at Auburn, Lee Co., Ala. (ND), as *Laciniaria Earlei*, with a racemose inflorescence of small campanulate heads on a tall, somewhat virgate stem, having appressed, non-scarious, purple, ciliolate-margined phyllaries, and narrowly lanceolate and linear leaves "glabrous . . . except for a few bristly marginal hairs at bases of some leaves". *Laciniaria Tracyi* Alex. (Man. S. E. Fl. 1335 (1933)) was also described from an Alabama plant (Oct. 31, 1903, *S. M. Tracy*, no. 8558, from Gateswood, Baldwin Co. (NY)) as having somewhat rounded, spatulate, pubescent phyllaries and linear, very scabrous lower leaves. Examination of the two type specimens showed no further marked differences in heads, flowers or leaf-shape and, as in other species of the genus there occurs the entire range from glabrous to scabrous leaves. it seemed these two were very similar, especially, since in a specimen like *E. W. Graves*, no. 587, from the barrens w. of Spring Hill, Mobile Co., Ala. Oct., 1918 (US), there is to be seen a very close parallel to Tracy's plant with, in addition, two very basal leaves that are long and lanceolate. The description of *L. Ruthii* Alex. for a plant collected

Oct. 1896, *A. Ruth*, no. 34, from the Hiwassee Valley, E. Tennessee (NY), with glabrous linear-lanceolate leaves and slightly larger heads, would seem to suggest a plant slightly more robust, but with heads having similarly somewhat spatulate, pubescent (though longer) phyllaries and glabrous rather than scabrous leaves. Examination of the types and comparison of a number of specimens, having smaller heads, from North Carolina to Florida and from Tennessee to Mississippi show that it is an easy step from Michaux's South Carolina plant (the type of *L. squarrulosa*) to the Alabama plants of Earle and Tracy and another easy step to the glabrous one of Ruth from Tennessee. All have 15–25-flowered heads with the narrower herbaceous phyllaries and, though Michaux described those of his plant as squarrose and in the others they were stated to be erect, it is found that they are sometimes squarrose in heads of the narrow-leaved plants from Alabama. Thus, though it is difficult to draw sharp lines, the prevalence of linear or sharply pointed, narrowly lanceolate-linear, upper cauline leaves with lanceolate lower ones in the type plants of Earle, Tracy and Ruth, represents the trend in these smaller-headed relatives of *L. scariosa* from the region around the Gulf of Mexico in Alabama and Mississippi and northward. Specimens from the middle and northern counties of Alabama, as Talladega, Jefferson and Cullman, foretell by their lanceolate basal leaves the material from Tennessee. Since none of these specimens have the broadly obovate basal and narrower but still oblanceolate upper leaves of Michaux's plants of *L. squarrulosa* we are including them under *Liatris Earlei*.

As in all species of this series, plants of intermediate characters between two species of the same geographic range can be recognized. In Tennessee, from which the lanceolate-leaved specimen of Ruth came, other specimens show, in combination with broadly lanceolate basal leaves quite scarious-margined and slightly crisped elongate phyllaries, thus suggesting a blending with *L. aspera* var. *intermedia*. Biltmore Herb., no. 2670, from dry soil, Lookout Mt., Hamilton Co., Aug. 24, 1897 (US, 332418) is such a specimen while another sheet, also Biltmore Herb., 2670 (US, 957890) of the same date and locality, is clearly *L. aspera* var. *intermedia*. Similar to the above intermediate are Biltmore

Herb. No. 2670b, from dry soil, near Hendersonville, Henderson Co., N. C., Sept. 14, 1898 (US) and Biltmore Herb. No. 2670l, from Chickamauga Park, Ga., Sept. 21, 1899 (US). So also collections from Illinois of Sept. 13, 14, and 23, 1914, *R. Ridgway*, nos. 90, 88, and 87 respectively, from Calhoun prairie, from near Olney and from Sugar Creek prairie, seem to present intermediates between the very asperous form of *L. Earlei* and *L. scabra*.

Series VII. ELEGANTES. Distinctive species with plume-like inflorescence due to long heads (2.5–3 cm. long) in loose spicate to paniculate arrangement with prolonged, colorful, scarious, reflexed phyllaries; corolla as frequently white as purple. nonpilose within; achene 4–6 mm. long; pappus 9–11 mm. long and manifestly plumose.

From South Carolina and Florida and westward into Texas and south-west Arkansas.

23. Liatris elegans (Walt.) Michx. Rootstock commonly relatively small, globose, 1–3 cm. in diameter, though in one variety elongate, tapering, up to 3 cm. in diameter and 15 cm. long; stems one or two, 3–12 dm. high, finely pubescent and leafy: leaves sessile, glabrous, punctate, linear to linear-lanceolate, reduced upwards from basal ones not more than 10 cm. long and 5 mm. wide to bracts subtending the long heads; upper leaves commonly soon deflexed; inflorescence 3–5 dm. high, cylindrical to pyramidal according to amount of elongation basally of usually short pedicels of subsessile heads into longer sub-branched peduncles; heads usually 5-flowered, 2.5–3 cm. long; outer phyllaries short, lanceolate, herbaceous: inner ones prolonged into dilated, lanceolate and reflexed or truncate and rounded, petaloid, serrulate tips, phlox-pink or white and surpassing the flowers and pappus; corolla 9–11 mm. long, as frequently white as purple, or of intermediate mauve shades (yellow in the singular f. *Fisheri*), nonpilose within; stamens usually purple even within the white flowers, though sometimes white also; achene 4–6 mm. long; pappus long-plumose, 9–11 mm. long.—Fl. Bor.-Amer. ii. 91 (1803); Willd. Sp. Pl. iii. 1635 (1803)[1]. *Staehelina elegans* Walt. Fl. Car. 202 (1788). *Serratula speciosa* Ait. Hort. Kew. iii. 138 (1789). *Eupatorium speciosum* Vent. Hort. Cels. 79 (1802). *Liatris radians* Bertol. Misc. v. 9. t. 1 (1846).

[1] See Schubert in Rhodora xliv. 147–150 (1942) for comparative dates of publication.

KEY TO VARIETIES

a. Inner phyllaries dilated into lanceolate, reflexed serrulate petaloid tips....b.
  b. Rootstock small, rounded; common over the range of the species.....var. *typica.*
  b. Rootstock elongate, tapering; found only in the Carizzo sand of Texas.....var. *carizzana.*
a. Inner phyllaries dilated into truncate, rounded, irregularly serrate, scarious tips; found only on St. Helena Isl., South Carolina.....var. *flabellata.*

Var. **typica.** Rootstock small, globose, as found commonly over the range of the species: inner phyllaries with lanceolate-acuminate, dilated, petaloid apices showing the midrib extended at the tip, ca. 2 cm. long; corolla-tube 9–11 mm. long; achene 4–5 mm. long; pappus 8–11 mm. long.—*Liatris elegans* (Walt.) Michx. Fl. Bor. Amer. ii. 91 (1803) sens. strict.; Willd. Sp. Pl. iii. 1635 (1803); Edwards Bot. Reg. t. 267 (1818); DC. Prodr. v. 129 (1836); Torr. & Gray Fl. N. Am. ii. 68 (1841); Gray Synop. Fl. i². 109 (1884). *Laciniaria elegans* O. Ktze. Rev. Gen. i. 349 (1891); Small, Man. S. E. Fl. 1332, with fig. (1933).

From South Carolina, south to Florida and west through Alabama, Louisiana, into Texas and again northward into southwest Arkansas.—SOUTH CAROLINA. Without stated locality: *Chapman* (G). Co. undetermined: low country of South Carolina, *L. R. Gibbes* (NY). GEORGETOWN Co.: pine barrens, 5 mis. s. of Georgetown, Sept. 9, 1939, *R. K. Godfrey*, 8135 (G, NY). BEAUFORT Co.: Beaufort District, 1882 (no. 377), 1888, *Dr. J. H. Mellichamp* (US); Bluffton, *Dr. J. H. Mellichamp* (NY); in woods, St. Helena Isl., Sept., *A. Cuthbert* (NY); dry woods, St. Helena Isl., Sept. 1883, *A. Cuthbert* (F); dry barrens, St. Helena Isl., Sept. 1884, Sept. 1894, *A. Cuthbert* (F); dry woods, St. Helena Isl., Sept. 1900, *A. Cuthbert* (NY, US); St. Helena Isl., Sept. 1900, *A. Cuthbert* (US); dry open woods, St. Helena Isl., Sept. 1894, *A. Cuthbert* (US); Sept. 21, 1902, Oct. 12, 1902, *A. Cuthbert* (F). GEORGIA. Without stated locality: 1839, *Dr. Torrey* (G, NY); *Dr. Boykin* (NY). Co. undetermined: along Flint River, *Ex. Herb. Chapman* (US). RICHMOND Co.: barrens, Augusta, Sept. 1896, *A. Cuthbert* (NY). BIBB Co.: sandy ridges, 5 mis. e. of Macon, Sept. 4, 1883, *J. D. Smith*, 2004 (US). TAYLOR Co.: dry sand hills, Anthony's Mill, 4 mis. w. of Reynolds, Sept. 14, 1936, *J. H. Pyron & R. McVaugh*, 1300 (US). CHATTAHOOCHEE Co.: dry soil, near Columbus, Sept. 17, 1902, *ex Biltmore Herb.*, 2668h (NY); sandy banks, 4 mis. e. of Columbus, Sept. 7, 1883, *J. D. Smith*, 1981 (US); Chattahoochee, Aug. 23, 1897, *S. M. Tracy* 3423 (NY). SUMTER Co.: dry sandy soil, south of Americus, Aug. 29, 1900, *R. M. Harper*, 532 (G, NY, US). CHARLTON Co.: St. Mary's River Swamp, below Trader's Hill, July 24–26, 1895, *J. K. Small* (NY). FLORIDA. Without

stated locality: 1842–49, *F. Rugel*, 471 (US). Co. UNDETERMINED: southern Florida, *ex Chapman Herb.* (NY); in dry, gravelly oakwoods, *ex Chapman Herb.* (G). DUVAL Co.: dry pine barrens, Jacksonville, Oct. 22, 1894, *A. H. Curtiss*, 5309 (G, NY, US); vicinity of Jacksonville, *A. H. Curtiss*, 1877 (ND); near Jacksonville, Oct. 21, 1893, *A. H. Curtiss*, 4445 (US); dry pine barrens, near Jacksonville, Oct. 1888, *A. H. Curtiss*, 1170 (G, NY, US, ND); St. Nicholas, July 28, 1896, *L. H. Lighthipe*, 335 (NY). COLUMBIA Co.: in high pine-turkey-oak woods n. of Camp Oleno, Oct. 6, 1940, *W. A. Murrill* (F). HAMILTON Co.: banks of Suwannee R., White Springs, Sept. 30, 1941, *E. West & Miss L. Arnold* (F). GADSDEN Co.: Quincy, Sept. 4, 1895, *G. V. Nash*, 2570 (G, NY, US, ND, F); Tallahassee, *N. K. Berg* (NY); open pinelands, western part of county, Aug. 30, 1936, *H. Foster*, 116 (F). WAKULLA Co.: without locality, Nov. 1891, *W. G. Farlow* (G). JACKSON Co.: Sneads, Aug. 19, 1942, *R. A. Knight* (F). WASHINGTON Co.: s. of Chipley, Aug. 23, 1942, *M. Senner* (F). OKALOOSA Co.: Crestview, Oct. 21, 1936, *Miss M. Hodges* (F). SAINT JOHNS Co.: dry pine barrens, St. Augustine, Oct. 1875, *Miss M. C. Reynolds* (NY, US, ND); pine barrens, Oct. *Miss M. C. Reynolds*, 306 (US). ALACHUA Co.: roadside, Hawthorne Rd., Oct. 31, 1931, *Miss L. Arnold* (F). TAYLOR Co.: high pine-oak woods, 9 mis. s. of Perry, Oct. 8, 1940, *W. A. Murrill* (F). MARION Co.: Citra, Nov. 10, 1941, *R. A. Knight* (F); high pineland, Belleview, Sept. 15, 1927, *O. F. Burger & E. West* (F). CITRUS Co.: sandy dry oak-pine woods, on U. S. Hwy. 41, 2 mis. s. of Holder, Oct. 16, 1945, *H. H. Hume* (F). PASCO Co.: dry woods, Lacoochee, Sept. 15, 1927, *O. F. Burger & E. West* (F). HILLSBOROUGH Co.: Tampa Bay, *G. Thurber* (G). ALABAMA. Without stated locality: *Mr. Lea* (G); 1840, *ex Herb. Meisner* (NY); *Gates* (G, NY, B, isotypes of *L. radians* Bertol.); Oct. 1820, *S. B. Buckley* (G). Co. undetermined: pine woods, Sept., *S. B. Buckley* (NY, US). LEE Co.: open pine woods, 6 mis. s. of Auburn, Sept. 23, 1899, *F. S. Earle & E. S. Earle*, 94 (G, NY, US, ND); Auburn, Sept. 11, 1898, *F. S. Earle & C. F. Baker* (NY, US), *C. F. Baker* (NY), Sept. 9, 1897, *F. S. Earle & C. F. Baker*, 1341 (NY), Sept. 1900, *F. E. Lloyd & F. S. Earle* (NY). AUTAUGA Co.: sandy old field, between Autaugaville and Booth, Sept. 24, 1934, *R. M. Harper*, 3264 (G, NY, US). BARBOUR Co.: sandy roadside, between Cottonton & Eufaula, Aug. 12, 1927, *K. M. Wiegand & W. E. Manning*, 3172 (G); around Eufaula, Aug. 1888, *G. McCarthy* (US). ESCAMBIA Co.: in high pineland, Canoe, Oct. 25, 1932, *F. S. Blanton*, 7071 (US); in low pineland, Atmore, Aug. 3, 1933, *O. Blanton*, 152 (G); in high hammock, 3 mis. n. of Canoe, Oct. 17, 1929, *H. O'Neill*, 6171 (US, F). BALDWIN Co.: Gateswood, Oct. 30, 1903, *S. M. Tracy*, 8568 (G, NY, US, T). Mo-

BILE Co.: dry exposed banks, Mobile, Oct. 16, 1896, *C. Mohr* (US); dry pine woods, Mobile, Sept. 28, 1878 (US); Mobile, Oct., *C. Mohr* (US); Mobile, 1868, *C. Mohr* (US); dry close soil, copses and thickets, Mobile, Oct. 16, 1886, *C. Mohr* (US); dry pine barrens, Mobile, Sept. 1, 1862, *C. Mohr* (Q); pine barrens, w. of Spring Hill, Aug. 1918, *E. W. Graves*, 691 (US). ARKANSAS. Without stated locality: *Drummond*, 141 (G); *Leavenworth* (NY). GARLAND Co.: dry woods, Glenwood Rd., 8 mis. from Hot Springs, Aug. 11, 1935, *F. J. Scully*, 434 (G); open field, Glenwood Rd., 8 mis. from Hot Springs, Aug. 8, 1935, *F. J. Scully*, 499 (G); Hot Springs, Aug. 1879, *G. W. Letterman* (US). HOT SPRINGS Co.: dry sandy ground, Malvern, Sept. 4, 1915, *E. J. Palmer*, 8453 (US). PIKE Co.: dry, rocky, oak-hickory woods, between New Hope & Langley, Oct. 5, 1932, *D. Demaree*, 9501 (G, NY). CLARK Co.: Gurdon, *C. Mohr* (US). BRADLEY Co.: rich open wood, Jersey, Sept. 18, 1938, *D. Demaree*, 18325 (O). HEMPSTEAD Co.: banks of Yellow Creek, near McNab, Oct. 5, 1923, *J. M. Greenman*, 4427 (G); sandy pine woods, Fulton, Oct. 15, 1914, *E. J. Palmer*, 6844 (US). MILLER Co.: near Texarkana, Aug. 20, 1898, *A. A. Heller & E. G. Heller*, 4124 (G, NY, US). LOUISIANA. Without stated locality: *ex. Torrey Herb., C. W. Short* (NY). Co. undetermined: Red River, no collector, no date (G). NATCHITOCHES Co.: sandy open woods, Natchitoches, Sept. 30, 1915, *E. J. Palmer*, 8753 (US). RAPIDES Co.: Levins, Alexandria, Nov. 8, 1893, *C. Mohr* (NY); Alexandria, 1842, *Hale* ((G, without stated locality), NY, US); Glenmora, Sept. 30, 1913, *F. W. Pennell*, 5634 (NY); open dry hillside, n. edge of Pineville, July 30, 1938, *D. S. Correll & H. B. Correll*, 9931 (G, NY). TEXAS. Without stated locality: Sept. 1850, *G. Thurber* (G); *Wright* (G). 1843, *Lindheimer*, 71 (G). Co. undetermined: Shawnee villages, Canadian R.,[1] Aug. 1853, *Lieut. A. W. Whipple Exped., J. M. Bigelow*, 1853–4, (NY, US); between Indianola & San Antonio, Oct. 9, 1891, *A. Schott* (NY); without stated locality: Mexican boundary survey of Major Emory, *C. C. Parry, J. M. Bigelow, C. Wright & A. Schott*, 451 (NY). BOWIE Co.: sandy soil, near Texarkana, Oct. 7, 1903, *ex Biltmore Herb.* 2668k (NY); Texarkana, *G. Letterman*, Oct. 15, 1894 (NY, US), Oct. 19, 1894 (US), Sept. 27, 1927, *B. C. Tharp* (G); oak-hickory w. of Texarkana, Sept. 27, 1927, *B. C. Tharp*, 2519b (G); Texarkana, 1896, *E. N. Plank* (NY), Sept. 21, 1877, *L. F. Ward* (US); dry open woods, Texarkana, Oct. 27, 1925, *E. J. Palmer*, 29412 (G). RED RIVER Co.: sandy loam, near Detroit, Sept. 15, 1937, *E. Adams*, 35 (US). GRAYSON Co.: Denison, Sept. 12, 13, 1906, *F. L. Tyler* (US). CASS Co.: Gallo-

[1] According to Bigelow, Report on Lieut. Whipple's Expedition, p. 96, Sec. 4. *L. elegans* was collected on this trip from Shawnee villages along the Canadian River, in August.

way, near Atlanta, Oct. 9, 1895, *E. Seler*, 1007 (G); Bivins, Oct. 15, 1940, *O. McGinnis*, 28011 (G). DENTON Co.: prairies, on Houston clay, between Benton & Aubrey, Sept. 22, 1937, *W. L. McCart* (US). UPSHUR Co.: open ground, deep fine sands, Big Sandy, Sept. 27, 1926, *E. J. Palmer*, 31749 (G, NY). DALLAS Co.: Dallas, Aug. 1876, *J. Reverchon* (NY). TARRANT Co.: in deep woods, Riverside, Sept. 12, 1926, *A. Ruth*, 1435 (US). GREGG Co.: without stated locality, Autumn, 1939, *C. L. York* (G). SMITH Co.: sandy fields and open places, in pine-oak woods, s. e. of Camp Fannin, 8 mis. n. e. of Tyler, Oct. 12, 1943, *H. E. Moore*, 556 (G). SAN AUGUSTINE Co.: San Augustine, *G. L. Crockett* (US). HOUSTON Co.: deep sands, open woods, Grapeland, Sept. 22, 1917, *E. J. Palmer*, 12842 (G). WALKER Co.: 8¾ mis. n. of Huntsville, Sept. 29, 1934, *V. L. Cory*, 10469 (G); in an old graveyard, vicinity of Huntsville, July 9–12, 1909, *R. A. Dixon*, 332 (G, NY); Timberline, 14½ mis. s. w. of Huntsville, Sept. 28, 1934, *H. B. Parks & V. L. Cory*, 10254 (T). MILAM Co.: sandy woods, 4 mis. east of Cameron, Aug. 4, 1929, *S. E. Wolff*, 11026 (US). HARDIN Co.: 5 mi. south of Silsbee, Oct. 15, 1936, *V. L. Cory*, 20035 (G). JEFFERSON Co.: Nome, Sept. 2, 1937, *G. L. Fisher*, 37159 (US). HARRIS Co.: 10½ mis. west of Laporte, Oct. 8, 1934, *Cory*, 11415 (G), Houston, Aug. 19, 1923, *G. L. Fisher*, 56 (US). AUSTIN Co.: Industry, 1894, *H. Wurzlow*, 30 (US). GONZALES Co.: Palmetto State Park, Aug. 1, 1941, *B. C. Tharp*, 145 (G); without locality, Oct. 10, 1940, *Tharp* (G). VICTORIA Co.: Aloe, Sept. 18, 1913, *F. W. Pennell* (NY). ATASCOSA Co.: sandy open ground, Pleasanton, Sept. 23, 1916, *E. J. Palmer* 10794 (US). NUECES Co.: Flour Bluff, 12 mis. south of Corpus Christi, Sept. 27, 1936, *S. G. & J. A. Drushel*, 10396, (NY). BROOKS Co.: Santa Fe Ranch, June 26, 1941, *Tharp* (G). KLEBERG or KENNEDY Co.: shell bank on Padre Island, Sept. 3, 1927, *Tharp* (G). OKLAHOMA. MCCURTAIN Co.: deep, rich coastal plain woods, near entrance to cypress swamp 5 mis. southeast of Broken Bow, Oct. 2, 1940, *M. Hopkins*, 5566 (G).

Var. TYPICA forma FISHERI Standl. Differing from var. *typica* only in having the corolla, as well as the tips of the phyllaries, lemon-yellow.—Field Mus. Pub. Bot. xi. 276 (1936).—Known only from the type specimen, collected Aug. 26, 1934 by *G. L. Fisher* on hillsides near and on the highway, Copperas Cove, Coryell, Texas (Chicago).

Var. **carizzana,** var. nov., planta robusta ad 9 dm. alta, a var. *typica* rhizomate elongato conico 2.5 cm. diametro ad 15 cm. longo, phyllariis paullo longioribus (2.5 cm.), achaeniis 6 mm. longis, pappo 11–12 mm. longo diversa.—Medina, Wilson, Atascosa and Hudspeth counties, Texas.—TEXAS. MEDINA Co.: 3 mi. southwest of Devine, Oct. 12, 1934, *V. L. Cory*, 11726

(G, type); 2¾ mi. southwest of Derby, May 8, 1935, *H. B. Parks & Cory*, 12778 (T). WILSON Co.: Kicaster School, Oct. 22, 1934, *Parks & Cory*, 11877 (T), June 24, 1935, *Parks & Cory*, 15136 (T); post-oak woods, July 21, 1925, *Tharp* (G). ATASCOSA Co.: 9 mi. east of Poteet, Nov. 12, 1934, *Cory*, 11721 (G). HUDSPETH Co.: Sierra Blanca, Sept. 7, 1925, *Tharp*, 3772 (US).

Var. **flabellata** (Small), n. comb. Differing from var. *typica* only in having inner phyllaries with rounded, dilated, toothed, petaloid tips.—*Laciniaria flabellata* Small, Bull. Torr. Bot. Club, xxv. 472 (1898). *Liatris flabellata* (Small) K. Sch. Just, Bot. Jahresb. xxvi. pt. 1, 378 (1900). SOUTH CAROLINA. BEAUFORT Co.: dry, open woods, St. Helena Isl., Sept. 1894, *A. Cuthbert* (NY, type, US).

As stated in the introduction, plants growing [in the outcropping of the Eocene] in the Carrizzo sands of Medina, Bexar and Wilson counties of Texas are all said to have deeply penetrating root systems. As all specimens of *Liatris elegans* I have seen from these counties, as well as one from Poteet, Atascosa Co., where there is the same formation, have such very long underground systems, really remarkable in a species which has usually a relatively small globose corm, it has seemed advisable to make of these a variety, here called var. *carizzana*. The only other specimen of *L. elegans*, not coming from this region, with an elongate rootstock is one of Sept. 7, 1925, *B. C. Tharp*, no. 3772, from Sierra Blanca, Hudspeth Co., Texas (US), and concerning the soil in which it grew, Prof. B. C. Tharp[1] has written "deep sand and in that respect it resembles the Carizzo sand very much".

The type collection of *Laciniaria flabellata* Small provides the only examples of specimens with dilated, truncate, petaloid, inner phyllaries. Several other collections in successive years by the same collector from that island are quite like *Liatris elegans* var. *typica*, although the acuminate phyllaries are always quite conspicuous and somewhat serrate. On the sheet of a collection made on Sept. 21, 1902 (F), is the collector's observation "note gradation from typical acuminate bracts of *elegans* towards *flabellata*." Though the modification has seemingly been a very rare one, it is here given varietal rank under *L. elegans*.

A hybrid of this species and *L. tenuifolia* Nutt. was discussed under that species (see no. 15).

[1] By private communication.

Series VIII. Punctatae. Plants mostly glabrous, with many-stemmed, generally erect, though sometimes recumbent spikes from an elongate, branching rootstock in two species and a globular one in other species; leaves numerous, mostly conspicuously punctate, linear and narrow; inflorescences generally densely spicate (rarely loose); heads slenderly cylindrical, 8–20 mm. long, 4–8-flowered (10–14 flowers in one species) with herbaceous appressed phyllaries; corolla-tube quite pilose within; achene 5–12 mm. long; pappus distinctly plumose, 8–15 mm. long.—From northern Mexico and Texas to the prairies of southern Canada and west to the east side of the Rocky Mts.

a. Plants with a long underground rootstock . . . . b.
  b. Stems moderately stiff; leaves 1.5–5 mm. wide, conspicuously punctate, frequently ciliate; rootstock deeply penetrating; plants of wide range . . . . . 24. *L. punctata.*
  b. Stems more slender and flexible; leaves 1–2 mm. wide, punctate, not ciliate; rootstock horizontal; in sandy prairies in Minnesota . . . . . 25. *L. densispicata.*
a. Plants with a somewhat globular corm . . . . c.
  c. Heads 4–6-flowered . . . . d.
    d. Leaves 1.5–5 mm. wide, punctate, stiff; phyllaries mucronate-tipped; heads numerous or rarely few and distant . . . . . 26. *L. mucronata.*
    d. Leaves 1–3 mm. wide, almost epunctate, soft; phyllaries acuminate; heads numerous . . . . . 27. *L. angustifolia.*
  c. Heads 10–14-flowered, few, very distant on few-branched stems; leaves narrow, rather channelled and bract-like . 28. *L. bracteata.*

24. Liatris punctata Hook. Stems numerous, glabrous, striate, 1.5–8 dm. long, from a crown above an elongate, mostly branched rootstock, often penetrating long distances: leaves numerous, glabrous, rigid, linear, conspicuously punctate (but not to be distinguished from other species by this punctate character which is common to most); basal leaves 8–15 cm. long, 1.5–6 mm. wide, with cutinous margin bearing prominent cilia or only scantily so provided, gradually diminishing, below the beginning of a short spike or through the spike in the case of a longer one, to bracts shorter than the heads they subtend: inflorescence generally densely, sometimes loosely spicate, 6–30 cm. in length and 2–3 cm. in width when flowers are open, of usually crowded heads 1.5–2 cm. long, 8–10 mm. wide, containing 4–8 flowers; phyllaries herbaceous, thick, punctate and closely appressed except for the free tips, the outer short, rigid, ovate-acuminate or cuspidate, the inner oblong with acute or mucronate to lanceolate-acuminate tips, 10–14 mm. long and 1.5–2 mm. wide, prominently ciliate-margined in individuals having cilia on the margin of the leaves and correspondingly less ciliate to merely membranous-margined in others; corolla purple (rarely white) 9–12 mm. long, with the tube inside and filaments of stamens quite pilose; pappus distinctly plumose, 9–11 mm. long,

usually slightly exceeded in length by the corolla; achene 6–7 mm. long, ribbed and hairy.—Fl. Bor.-Amer. i. 306, t. 305 (1834). *Laciniaria punctata* (Hook.) O. Ktze. Rev. Gen. i. 349 (1891). *L. cylindrica* Torr., Ann. N. Y. Lyceum, ii. 210 (1824), as to plant described. *Laciniaria punctata* var. *turgida* Lunell, Amer. Mid. Nat. v. 241 (1918). *Laciniaria punctata* f. *corymbosa* Sheldon, Quart. Bull. Univ. Minn. i. 27 (1892) and f. *albiflora* Sheldon ibid. 26.

KEY TO VARIETIES

a. Inflorescence dense . . . . b.
  b. Stems stiff and short, 1.5–3 dm. tall; leaves 3–5 mm. wide, ciliate-margined; phyllaries prominently ciliate; of more northern plains and western mountains . . . . . var. *typica.*
  b. Stems more slender, 4–8 dm. tall; leaves narrower, 2–3 mm. wide, and longer than in var. *typica;* leaves and phyllaries without prominent ciliate margins; Minnesota and Dakota, southward to the plains of Texas . . . . . var. *nebraskana.*
a. Inflorescence lax; stems tall; leaves few and larger than in var. *typica,* 12.5–15 cm. long and 4–6 mm. wide, almost glabrous; heads fewer and scattered; mountains of Trans-Pecos Texas and northern Coahuila, Mexico . . . . . var. *mexicana.*

Var. **typica.** Stems 1.5–3 dm. long and stiff: basal leaves 8–10 cm. long and 3–5 mm. wide with prominent cilia along the cutinized margin: inflorescence a short spike 6–20 cm. in length, of crowded heads ca. 2 cm. long, containing 5–8 flowers: phyllaries prominently margined by long white cilia, inner ones lanceolate-acuminate or oblong with acute or mucronate tips.—*L. punctata* Hook. Fl. Bor.-Amer. i. 306 t. 305 (1834), sens. strict. *Liatris punctata* var. γ, Torr. & Gray Fl. N. Am. ii. 69 (1841).

From Manitoba and Saskatchewan south to Iowa and Kansas, and from Alberta southward along the eastern Rockies into New Mexico and Trans-Pecos Texas.—MANITOBA.[1] 62 H 14: dry gravelly knolls, Fort Garry (Winnipeg), Aug. 5, 1872, *J. Macoun,* 9851 (stem to right) (Ot). 62 G 3: on the open prairie, Chater, July 25, 1896, *J. Macoun,* 12227 (Ot). 62 G 4: on the hill s. of the lake, Killarney, Aug. 3, 1896, *J. Macoun,* 12196 (Ot). 62 G 16: Portage la-Prairie, Aug., 1896, *J. K. McMorine* (Q); 62 K 1: Rivers, Aug. 7, 1933, *H. H. Brown* (HB). MINNESOTA. WASHINGTON Co.: St. Paul & St. Anthony, 1861, *T. J. Hale* (G). OTTER TAIL Co.: dry prairies, Perham, Aug. 14, 1910, *Z. L. Chandonnet* (US). HENNEPIN Co.: dry rocky hillside, Fort Snelling, Sept. 1, 1888, *E. A. Mearns,* 140 (NY, US); Fort Snelling to rivers of north, *Dr. Jarvis* (G). NOBLES Co.: dry hills, Adrian, Aug. 22, 1895, *F. W. Hunnewell* (G). IOWA. PLYMOUTH Co.: Akron, Sept. 1909, *Mrs. E. Bredall* (US). WOODBURY Co.: Sioux City, Aug. 29, 1896, *L. H. Pammel,* 39 (NY, US). NORTH

[1] Localities in Manitoba, Saskatchewan and Alberta are indicated by standard notation with reference to sheets of the National Topographical Series, Dept. Mines & Resources, Ottawa, Canada.

DAKOTA. BOTTINEAU Co.: Bottineau, Aug. 24, 1890, *C. B. Waldron* (NY). WARD Co.: on roadside, Minot, Aug. 18, 1931, *Miss R. Weikert*, 1 (NY). BENSON Co.: prairies, Leeds, Aug. 28, 1899, *J. Lunell* (G); in dry prairies, Leeds, Sept. 8, 1909, *J. Lunell* (US); Butte, *J. Lunell*, Oct. 21, 1908 (US), Oct. 2, 1908 (NY). BURLEIGH Co.: along Missouri R., near Bismarck, Aug. 26, 1917, *F. P. Metcalf*, 369 (G). STARK Co.: Dickinson, Sept. 8, 1908, *W. R. Holgate* (G). SOUTH DAKOTA. Co. undetermined: western part of State, Aug. 1891, *T. A. Williams* (US). ROBERTS Co.: clay banks, Big Stone Lake, Aug. 1922, *W. H. Over*, 14351 (US). GRANT Co.: virgin prairie, Troy, near Big Stone Lake, Aug. 4, 1940, *P. Johnson*, 68 (G, NY). DAY Co.[1]: sandy, arid prairie heights, around the Sioux, lower St. Peter R., near Fort Pierre, Missouri Hills, dividing ridges between Missouri & Mississippi waters, Aug. 20, 1839, *Nicollet's N. W. Exped.*, 272 ("var. γ") (US); (without stated locality), *Nicollet's N. W. Exped., C. A. Geyer* (G "var. γ" (NY "var.")); probably DAY Co.: Oak Gulch, Sept. 5, 1896, *L. W. Carter* (NY). BUTTE Co.: Belle Fourche, July 30, 1926, *H. E. Hayward*, 31 (NY). BROOKINGS Co.: White, Aug. 29, 1906, *Miss F. N. Vasey* (US). KINGSBURY Co.: Iroquois, Aug. 9, 1894, *J. J. Thornber* (G). WASHABAUGH Co.: Pine Ridge Reservation, Aug. 1911, *S. S. Visher*, 2340 (NY). SHANNON Co.: Wolf Creek, near Pine Ridge Agency, Aug. 9, 1911, *S. S. Visher*, 2207 (NY). FALL RIVER Co.: Hot Springs, Sept. 1893, *Lieut. W. E. Safford* (US); Hot Springs (alt. 3500′), Aug. 3, 1892, *P. A. Rydberg*, 754 (US). NEBRASKA. THOMAS Co.: Thedford (excepting tall stem to right), Aug. 7, 1889, *H. I. Webber* (NY); on sandhills, on Middle Loup R., near Thedford Aug. 19, 1893, *P. A. Rydberg*, 1706 (US). ADAMS Co.: Hastings, Sept. 16, 1886, *Prof. Thompson* (G). KANSAS. CHEYENNE Co.: near Catholic Church, St. Francis, Sept. 7, 1936, *Mrs. J. M. Steller*, 91 (NY). DOUGLAS Co.: Lawrence, *W. C. Stevens* (US). WALLACE Co.: Wallace, Aug. 22, 1884, *G. W. Letterman* (NY). HAMILTON Co.: vicinity of Syracuse, Sept. 14, 1912, *J. N. Rose & W. R. Fitch*, 17013 (NY, US). STEVENS Co.: Moonlight, Aug. 15, 1893, *C. H. Thompson*, 174 (NY, US). MORTON Co.: without stated locality, July 28, 1891, *M. A. Carleton*, 353 (US). SASKATCHEWAN. Without stated locality: 1858, *Palliser's Br. N. Amer. Expl. Exped., E. Bourgeau* (G, NY); *ex Herb. Musei Brit. Douglas*, 9849 (Ot). Exact

[1] From Senate Report intended to illustrate a map of the Hydrographical Basin of the Upper Mississippi River made by I. N. Nicollet, Feb. 16, 1841, Washington, 1843, p. 53: "I was at St. Peter's when I made up my mind to visit the sources of the Mississippi"—"Left St. Peter's on July 26, 1836"—"on July 29, I was ascending the Mississippi". No dates are given in the further description of travel but from the map they were, on Aug. 19, west of Big Stone Lake near what is called Cold Spring Lake—mouth of the Sioux River. This would seem to be about Day County, S. Dakota (see also following discussion).

region undetermined, Saskatchewan plains, Aug. 3, 1872, *J. Macoun* (US without no.), 821 (NY). 72 P 14–13: Little Lake Manito, July 21, 1906, *J. Macoun & W. Herriot*, 77087 (G, Ot). 73 B 2: along the G. T. Rwy., 15 mis. w. of Saskatoon, July 29, 1906, *J. Macoun & W. Herriot*, 77086 (NY, Ot). 62 L 12: gravelly knolls in prairies, Indian Head, Sept. 16, 1891, *J. Macoun*, 9848 (Ot); 72 I 6: prairies, Moosejaw, July 31, 1904, *F. W. Johnson*, 972 (US). 72 J 16: prairies, Brownlee, Aug. 7, 1913, *F. W. Johnson*, 1259 (NY). 62 E 16: Moose Mountain, Aug. 1884, *J. Macoun* (US). 72 K 2: prairies, Sidewood, Assiniboine, Aug. 26, 1892, *F. E. Floyd* (NY). 62 F 12: Redvers, Aug. 19, 1909, *G. E. Copeland* (Q). 62 M I: Yorkton, Aug. 19, 1908, *W. Crawford* (Q). ALBERTA. Without stated locality: prairies, Aug. 21, 1913, *F. W. Johnson*, 1065 (US). 83 A 4: Red Deer, Aug. 2, 1917, *C. H. Young*, 92730 (Ot). 74 M 11: rwy. track, Scotfield, Aug. 10, 1926, *A. H. Brinkman* 2541 (US); 82 P: dry soil, prairie hills (alt. 2200′-2500′), Rosedale Coulee, Aug. 6, 1915, *Miss M. E. Moodie*, 1170 (G, NY, US). 82 O 1: dry hills, Calgary, Aug. 19, 1913, *Miss M. E. Moodie* (US); dry ground & prairies, vic. of Calgary, Elbow R. Valley (alt. 3400′–3600′) Aug. 6, 1913, *Miss M. E. Moodie*, 28 (NY); grassy hills ca. 13 mis. s. of Calgary, Aug. 1, 1941, *C. L. Hitchcock & J. S. Martin*, 7853 (NY). ca. 82 H 11: middle fork of Old Man R., Rocky Mts., Aug. 14, 1883, *Dawson*, 9850 (Ot). 82 H 11: near irrigation ditch, s. of Standoff (s. of MacLeod), Aug. 15, 1929, *E. H. Moss*, 410 (G). 82 H 12: in the valley of Old Man R., Fort McLeod, Aug. 24, 1897, *J. Macoun*, 22766 (Ot); prairies, Fort McLeod, Aug. 5, 1895, *J. Macoun*, 10829 (Ot); MacLeod, Aug. 1923, *R. H. Dixon*, 432 (NY); dry slope of gravelly ridge, w. of Pincher Creek, July 26, 1939, *E. H. Moss*, 62 (G); Oldham R., n. of Pincher, Aug. 2, 1939, *E. H. Moss*, 250 (G). MONTANA. Without stated locality: 1883, *L. F. Ward* (US). Co. undetermined: prairie, upper Missouri, Aug. 19, 1864, *T. M. Rothammer*, 477 (US); Mountain Sheep Buttes, Aug. 11, 1909, *V. L. Bailey* (US); without stated locality, Aug. 10, 1890, *J. W. Blankinship*, 131 (US); upper Missouri, Aug. 27, 1864, *T. M. Rothammer*, 490 (US). Sheridan Co.: Westby, Aug. 12, 1928, *Miss E. Larsen*, 211 (US). Dawson Co.: Colgate, near Glendive, Sept. 6, 1892, *J. H. Sandberg*, 1020 (US); Seven Mile Creek, 15 mis. above Glendive, Aug. 11, 1883, *L. F. Ward* (US). Cascade Co.: Belt Creek, July 1883, *F. W. Anderson* (US); (albino) Great Falls, Aug. 24, 1891, *R. S. Williams*, 76 (US). Lewis & Clark Co,: in vacant lots, Helena, Sept. 2, 1908, *B. T. Butler*, 649 (NY); White's Gulch, near Helena, Aug. 22, 1882, *W. M. Canby* (G); 6 mis. s. e. of Helena, Aug. 12, 1931, *J. T. Howell*, 7897 (NY). Treasure Co.: dry ground near Custer, Aug. 9, 1912, *H. D. House*, 4900 (US). Musselshell Co.: plains of Musselshell R.,

Sept. 2, 1896, *J. H. Flodman*, 817 (NY, US). JEFFERSON Co.: rocky slopes, above Jefferson R., 10 mis. e. of Whitehall, Aug. 5, 1941, *J. F. Brenckle & L. H. Shinners*, 41-061 (G). PARK Co.: Livingston, Yellowstone National Park, *Mrs. E. W. Scheuber*, Aug. 2, 1901 (US), 1901, 20 (NY). GALLATIN Co.: Bozeman, Aug. 17, 1900, *E. J. Moore* (G), Sept. 2, 1902, *W. W. Jones* (US); dry uplands, Bozeman, Aug. 24, 1905, *J. W. Blankinship*, 284 (US); Cinnabar, Yellowstone River, July, 1884, *F. Tweedy* (US). WYOMING. Without stated locality: July 25–30, 1870, *Hayden's U. S. Geol. Survey* (US). Co. undetermined: sources of the Platte, *Dr. James*[1] (NY); Aurora, July 30, 1900, *W. Granger* (NY). SHERIDAN Co.: Dayton (alt. 4000′), Sept. 1899, *F. Tweedy* 2072 (NY). PARK Co.: Clark's Fork R., Aug. 1881, *W. H. Forwood*, 21 (G). WESTON Co.: Cambria Canon, July 22, 1896, *A. Nelson*, 2529 (NY). JOHNSON Co.: dry plains near Rock Creek (alt. 6500′), Aug. 1, 1934, *R. C. Rollins*, 712 (G, NY); Buffalo (alt. 4000′–5000′), Sept. 1900, *F. Tweedy*, 3146 (NY). NIOBRARA Co.: dry plains, near Kirtly (alt. 5000′), Aug. 3, 1931, *R. C. Rollins*, 36 (NY). PLATTE Co.: Cottonwood Canon, Aug. 4, 1895, *A. Nelson*, 1564 (G, NY, US);[2] North Fork of the Platte River,[2] 1843–44, *Fremont's Exped. to California* (G, NY, US). ALBANY Co.: Dale Creek, Aug. 24, 1908, *Mrs. J. Clemens* (G); 15 mis. s. w. of Laramie, Aug. 22, 1901, *E. D. Merrill & E. N. Wilcox*, 1169 (G, US); dry bench lands, Centennial, Aug. 5, 1900, *A. Nelson*, 7952 (G, NY, US); Bear Creek, ca. 2 mis. from Eagle Rock & 4 mis. from Laramie Peak, Aug. 22, 1891, *C. Schuchert* (US). COLORADO. Without stated locality: 1870, *E. L. Greene* (G), 1878, *P. J. Mohr* (US 720072), *L. F. Ward* (US 134488). Co. undetermined: meadow at foothills of Colorado (alt. 6500′), Aug. 9, 1890, *C. S. Crandall*, 272 (US); Stanley's Ranch, *Mrs. C. N. S. Horner* (G). LARIMER Co.: Estes Park, Aug. 11, 1906, *E. L. Johnston*, 218 (US); Livermore, Aug. 22, 1900, *G. E. Osterhout*, 2231 (NY). BOULDER Co.: mts., Boulder, Sept. 3, 1895, *C. L. Shear*, 4456 (US); near Boulder, Oct. 1, 1900, *F. Ramaley*, A201 (US); Boulder, Aug. 1891, *Dr. E. Penard*, 265 (NY); mts. between Sunshine and Ward (alt. 8000′–9500′), Aug. 1902, *F. Tweedy*, 4936 (NY). ARAPAHOE Co.: North Denver (plant to left), Aug. 16, 1910,

[1] This specimen, though without locality of collection on the Herbarium sheet, would seem to be that cited as *Liatris cylindrica* Torr. Ann. N. Y. Lyceum ii. 210 (1827) No. 204, for which is given, "sources of the Platte". (See also following discussion.)

[2] From report of Fremont's Expedition, Washington, 1845, the date is Aug. 29, and place of collection, Black Hills of the Platte. Following the account of the itinerary "Aug. 27, on their return they halted where they had taken dinner on July 27". By the map this was where Deer Creek enters the Platte, and is where Glenrock, Converse Co., Wyo. now is. Since they reached Fort Laramie on the last day of August the collection of *L. punctata* would be between Glenrock and Fort Laramie, possibly Platte Co..

Miss A. Eastwood, 44 (US); near Denver, Dec. 1, 1874, *C. Mohr*, (US); dry plains, n. w. of Denver (alt. 1500 m.), Sept. 17, 1901, *L. M. Underwood & A. D. Selby*, 529 (NY). JEFFERSON CO.: Golden, Oct. 8, 1882, *N. L. Britton* (NY); Golden (alt. 5500′), Aug. 21, 1884, *C. S. Sheldon*, 297 (NY); Morrison (alt. 6500′), Aug. 7, 1878, *M. E. Jones*, 546 (NY, US). DOUGLAS CO.: Buffalo Creek Canon, Sept. 14, 1909, *H. H. Rusby* (NY). EL PASO CO.: near Colorado Springs (alt. 6000′), Sept. 22, 1895, *S. L. Clarke*, 7 (NY); Colorado Springs (alt. 6000′), Sept. 19–21, 1895, *Mrs. S. L. Clarke* (NY). GUNNISON CO.: Gunnison, 1896, *F. Clements*, 229 (NY). CUSTER CO.: West Cliff, Aug. 13, 1896, *C. L. Shear*, 3458 (NY). OTERO CO.: vicinity of La Junta, Sept. 16, 1912, *J. N. Rose & W. R. Fitch*, 17064 (NY, US). HUERFANO CO.: Cucharas Valley, near La Veta (alt. 7000′), Sept. 26, 1900, *F. K. Vreeland*, 683 (NY). LAS ANIMAS CO.: Raton Mts., Sept. 1, 1898, *E. O. Wooton* (US); Wootton, Sept. 11, 1909, *H. H. Rusby* (NY). NEW MEXICO. UNION CO.: Folsom, Aug. 30, 1903, *A. H. Howell*, 165 (US). COLFAX CO.: Colfax, Aug. 13, 1910, *E. O. Wooton* (US); open, pine-oak woods top of Raton Pass, alt. 7800 ft., Aug. 18, 1941, *U. T. Waterfall*, 3502 (G); vicinity of Raton, Oct. 27, 1913, *J. N. Rose & W. R. Fitch*, 17546 (NY, US); Bartlett Ranch, Aug. 31, 1913, *Wooton* (NY); Vermejo Park (alt. 7600 Ft.), Aug. 31, 1913, *Wooton* (US), July–Aug., 1894, *Mrs. O. St. John*, 100 (G); vicinity of Ute Park, alt. 2200–2900 m., Sept. 21, 1916, *P. C. Standley*, 14240 (G). SAN MIGUEL CO.: 15 mi. northwest of Las Vegas, Aug. 30, 1934, *G. J. Goodman*, 2322 (G, NY, O); near Bernal, alt. 6300 ft., Aug. 27, 1903, *V. L. Bailey*, 546 (US). BERNALILLO CO.: among rocks and on hillsides, Canyon Media, Sandia Mts., *Miss C. C. Ellis*, 284 (US); dry flats, east slope Sandia Mts., alt. 7500 ft., *Ellis*, 284 (US). LINCOLN CO.: Block Ranch, north of Capitans, Aug. 31, 1900, *F. S. & E. S. Earle*, 384 (NY, US); El Capitan Mts., alt. 8000 ft., July 7, 1928, *Earle* (NY).

Var. TYPICA forma **coloradensis,** f. nov., phyllariis mucronatis purpurascentibus, foliis plerumque angustioribus.—Chiefly Colorado and New Mexico.—COLORADO. Without stated locality: 1862, *E. Hall* (US), *C. Mohr* (US, 783573). Co. undetermined: sterile plains (alt. 5700′), Aug. 20, 1884, *C. S. Sheldon*, 297 (US). WELD CO.: New Windsor, Aug. 20, 1901, *G. E. Osterhout*, 2339 (NY, US); Greeley, Aug. 11, 1881, *L. F. Ward* (US); Dent, Aug. 31, 1917, *W. W. Jones*, 535 (G). LARIMER CO.: Fort Collins (alt. 5000′), July 29, 1891, *J. M. Cowan* (NY); Fort Collins, Aug. 25, 1896, *C. F. Baker* (NY); College Farm, Col. Agric. College, July 29, 1892, *C. S. Crandall* (US); along rwy., s. of Agric. College, Aug. 23, 1898, State Agric. College, 2975 (NY, US); Estes Park, Aug. 1894, *Mrs. J. M. Milligan* (US). BOULDER CO.: without stated locality, Aug. 1882, *H. N. Patterson & F.*

Beatty, 58 (US). Arapahoe Co.: Melvin, Aug. 13, 1890, *E. L. Hughes*, 13 (G); plains, Denver, Sept. 12, 1888, *W. G. Smith* (US); North Denver, Aug. 16, 1910, *Miss A. Eastwood*, 44 (G, US plant to right); dry soil, Denver, Aug. 29, 1916, *I. W. Clokey*, 2682 (G, NY). Jefferson Co.: Golden, road up to Lookout Mt., Aug. 28, 1916, *E. L. Johnston*, 218B (G). Lincoln Co.: Hugo, July 28, *C. D. Marsh* (US). El Paso Co.: moist meadow among hills, 4 mis. s. of Palmer Lake, Aug. 7, 1941, *U. T. Waterfall*, 3203 (G); Colorado Springs, Aug. 20, 1889, *B. W. Evermann* (US, 310558 & 617864), Oct. 15, 1903, *W. C. Sturgis* (G, US), Oct. 1903, *Mrs. J. M. Milligan* (US); Colorado Springs (alt. 1900 m.), Sept. 22, 1915, *W. W. Eggleston*, 12031 (US); dry plains, Colorado Springs, Aug. 6, 1892, *C. S. Sheldon*, 473 (NY, US); Pike's Peak, Cheyenne Mt., north slope, July 28, 1896, *E. A. Bessey* (NY); Pike's Peak, Aug. 23, 1887, *S. M. Tracy & Evans*, 801 (stem to right) (NY); Garden of the Gods, Aug. 8, 1908, *C. E. Bessey* (US); dry hillsides, Colorado Springs, Aug. 3, 1939, *J. H. Ehlers*, 7785 (G); dry plains, near foothills, Aug. 11, 1897, *C. S. Crandall*, 2974 (G); "The Mesa", 3.5 mis. n. w. of Colorado Springs, Aug. 7, 1924, *R. Bacigalupi*, 678 (G); Manitou (alt. 2100 m.), Aug. 16, 1901, *F. E. Clements & E. S. Clements* 72 (G, NY, US). Chaffee Co.: Salida, Aug. 28, 1892, *Miss I. Mulford* (G, NY). Pueblo Co.: on plains about Pueblo, 1883, *R. W. Woodward* (G). Huerfano Co.: St. Mary's, *Mrs. C. N. S. Horner* (G). OKLAHOMA. Cimarron Co. (near New Mexico line): s. of Black Mesa 1½ mis. w. of Kenton, Aug. 6, 1941, *U. T. Waterfall*, 3176 (G). NEW MEXICO: Co. undetermined: from Cottonwood Creek[1] of Ark. to San Miguel, Aug. 1847, *A. Fendler*, 299 (G). San Doval Co.: hard clay soil, Nara Visa, Sept. 8, 1910, *G. L. Fisher*, 68 (US); dry open grassy ridges, Jemez Springs area, Aug. 24, 1931, *A. Nelson*, 11704 (G). San Miguel Co.: Las Vegas, June, 1920, *Bro. Anect*, 1 (NY); Pecos, *S. S. Holman* (US); near Pecos (alt. 6700′), Aug. 15, 1908, *P. C. Standley*, 4958 (US). Quay Co.[2]: Llano Estacado, Sept. 16, 1853, *Whipple Exped. J. M. Bigelow* (NY (US 2 stems to left)); Guadalupe Mts. (alt. 6000′–7000′), Sept. 3–6, 1915, *A. S. Hitchcock* (US); hard clay, Nara Visa, Sept. 8, 1910, *G. L. Fisher*, 68 (US). Dona Ana Co.[3]: valley of Rio Grande, Mexican Boundary Survey, 450 (NY, US).

[1] Plant. Fendl. gives this region for the collection of the specimen no. 299, *L. punctata*.

[2] According to Bigelow,—Report on Lieut. Whipple's Expedition (1857), p. 96, Sec. 4, *L. punctata* was collected in rocky prairies from the Canadian River, Aug. 26, to the Llano Estacado, August to September. On p. 3, Llano Estacado is described as "the space in our route between Valley River and Fossil Creek, near Tucumari hills. This is a dry and generally timberless tract of country extending over a distance of about one hundred and ninety miles". The region now would probably be included in Quay Co., New Mexico.

[3] Plant. Nov. Thurb. Gray, Mem. Amer. Acad. Ser. 2, v. 297–328 (1855), explains the route followed.

Var. **nebraskana,** var. nov., varietatem typicam simulans caudice subterraneo ad 4 dm. longo caulibus multis, plerumque minus rigidis et altioribus (2.5–5 dm. maturitate, 1–5 dm. juventute); foliis plerumque angustioribus, 2–3 mm. latis, flexilioribus marginibus aut haud aut leviter ciliatis; inflorescentia 10–25 cm. longa; capitulis densis ca. 1.5 cm. longis 4–6 floris; phyllariis plerumque submembranaceis rariter marginibus breviciliatis, interioribus lanceolato-acuminatis vel oblongis apice acuto.—*L. punctata* Hook. var. β. Torr. & Gray Fl. N. Am. ii. 69 (1841). *L. resinosa* sensu DC. Prodr. v. 129 (1836), not Nutt.

Type: on north hillsides, south of Chadron, Dawes Co., Nebraska, Sept. 1, 1936, *W. L. Tolstead* (G).

Wisconsin, Illinois and Arkansas, west to South Dakota, Colorado, and New Mexico.—WISCONSIN. St. Croix Co.: prairie hillside, 2 mis. w. of Robert, Aug. 6, 1934, *N. C. Fassett,* 16969 (G). ILLINOIS. DuPage Co.: Rwy. Lisle, July 8, 1925, *A. J. Prisc,* 26 (US). MINNESOTA. Pope Co.: dry prairies, Montevideo, Aug. 11, 1897, *L. R. Moyer* (NY). Hennepin Co.: St. Paul, 1861, *T. J. Hale* (G); sandy soil, Aug. 1890, *J. H. Sandberg* (NY); Minneapolis, Aug. 1868, *W. M. Canby,* 542 (US), Sept. 15, 1891, *J. H. Sandberg* (US). Martin Co.: without stated locality, Sept. 10, 1892, *R. I. Cratty* (G). IOWA. Without stated locality: *R. I. Cratty* (US). Emmet Co.: dry sandy knolls, Aug.–Sept. *R. I. Cratty* (NY). Clay Co.: gravelly prairie, cemetery in Dickens, Freeman Twsp., Sect. 17, Aug. 4, 1934, *Miss A. Hayden,* 10528 (NY). Woodbury Co.: Sioux City, Aug. 29, 1896, *L. H. Pammel,* 39 (G). MISSOURI. Shannon Co.: broad slopes & bald tops of loess hills, near Montier, Sept. 3, 1920, *E. J. Palmer,* 18944 (G). Taney Co.: limestone ledge, Malva, Sept. 17, 1924, *E. J. Palmer,* 26190 (NY). ARKANSAS. Without stated locality: 1839, *Latrobe* (NY). Carroll Co.: limestone ledges, Eureka Springs, Sept. 28, 1913, *E. J. Palmer,* 4514 (US). SOUTH DAKOTA. Without stated locality:[1] *Nicollet's N. W. Exped. C. S. Geyer* "var. B" (NY). Custer Co.: Custer (alt. 5500′), Aug. 1, 1892, *P. A. Rydberg,* 754 (NY). Probably Bennett or Washabaugh Co.: Bear Creek (albino), Aug. 1891, *T. A. Williams* (US). NEBRASKA. Cherry Co.: on hardlands, Fish Hatcheries, Valentine, Aug. 15, 1936, *W. L. Tolstead,* 702 (G). Dawes Co.: on north hillsides, s. of Chadron, Sept. 1, 1936, *W. L. Tolstead,* 800 (G, type). Thomas Co.: on sandhills, on Middle Loup R., near Thedford, Sept. 13, 1893, *P. A. Rydberg,* 1761 (NY); Thedford (1 tall stem to right), Aug. 7, 1889, *H. I. Webber* (NY). Buffalo Co.: without stated locality, Aug. 1922, *W. E. B.* (O). Adams Co.: Ayr, Aug. 31, 1905, *J. M. Bates* (G). KANSAS. Without stated locality:

[1] See also following discussion.

latitude 39°, 1868, *E. Hall* (US). Riley Co.: prairie, Sept. 12, 1895, *J. B. Norton*, 213 (G, NY, US); prairie, Sept. 12, 1895, *J. B. Norton*, 212 (G, US). Johnson Co.: s. of Holliday, Aug. 23, 1895, *C. Rowe*, 980 (NY). Linn Co.: prairie, Parker, Oct. 21, 1916, *G. W. Stevens*, 4346 (NY). Sedgwick Co.: Wichita, Sept. 1905, *S. F. Poole*, 226 (G); high prairies, Wichita, Sept. 9, 1890, *B. B. Smyth*, 254 (US). Neosho Co.: near Chanute, Sept. 23, 1896, *L. F. Ward* (US); Brookville, Sept. 1888, *R. G. Eccles* (NY). Pratt Co.: vicinity of Pratt, Sept. 23, 1912, *J. N. Rose & W. R. Fitch*, 17149 (US). Montgomery Co.: dry prairies, Cherryvale, Sept. 16, 1900, *F. W. Johnson* (NY). Cowley Co.: Winfield, Aug. 1911, *Miss F. N. Vasey* (US). Barber Co.: Medicine Lodge, 1906, *C. R. Ball*, 1081 (US). OKLAHOMA. Co. undetermined: open rocky hills, Sansbois Mts., Aug. 1891, *C. S. Sheldon*, 293 (US). Creek Co.: Sapulpa, Sept. 19, 1894, *B. F. Bush*, 216 (G, NY, US). Logan Co.: near Guthrie, Oct. 21, 1916, *R. Keyser*, 6087 (NY). Kingfisher Co.: Huntsville, Sept. 20, 1895, *Miss L. A. Blankinship* (US). Oklahoma Co.: sandstone hillside, Oklahoma City, Aug. 29, 1937, *U. T. Waterfall* (NY). Cleveland Co.: Norman, Sept. 25, 1914, *W. H. Emig*, 347 (US); 10 mis. e. of Norman, Aug. 20, 1903, *A. H. Van Fleet* (US); 2 mis. e. of Norman, *W. E. Bruner* (US). Murray Co.: Platt National Park, Sulphur, July 24, 1935, *G. M. Merrill*, 979 (NY). COLORADO. Co. undetermined: dry plains, *C. Mohr* (US, 783573). Larimer Co.: Estes Park, Aug. 11, 1905, *E. L. Johnston*, 218A (NY). Boulder Co.: Boulder, Sept. 1895, *P. A. Rydberg* (NY). Denver Co.: Denver, Sept. 23, 1887, *S. M. Tracy & Evans*, 902 (NY). El Paso Co.: Colorado Springs (alt. 1900 m), Sept. 22, 1915, *W. W. Eggleston*, 12027 (US); Colorado Springs, 1903, *H. L. Shantz*, 585 (US); Pike's Peak (plant to left), Aug. 23, 1887, *S. M. Tracy & Evans*, 80 (NY). NEW MEXICO. Co. undetermined: from Cottonwood Creek of the Arkansas to San Miguel, Aug. 1847, *A. Fendler* (328)[1] (G). Colfax Co.: Johnson's Mesa, Aug. 16, 1910, *E. O. Wooton* (US). San Miguel Co.: vicinity of Las Vegas, Sept. 11, 1895, *E. N. Plank* (NY). Quay Co.: Llano Estacado, Sept. 16, 1853, *Whipple Exped., J. M. Bigelow* (US, stem to right).

Var. **mexicana,** var. nov. a varietate typica differt plantis altissimis 5–8.5 dm. altis, plerumque caulibus paucis e caudice crasso subterraneo vel ovato vel subelongato; foliis paucis plerumque omnino glabrescentibus nitidis distantibus et maioribus 12.5–15 cm. longis 4–6 mm. latis; inflorescentia laxa, internodiis 1–2 cm. longis; capitulis 1.5–2 cm. altis, 5–6-floris; phyllariis vel ovato-acuminatis vel mucronatis, marginibus ciliatis aut sine ciliis.

[1] Plant Fendl. gives this date and region for the collection of *L. punctata* (328), which bracketed number is the one under which it was distributed.

TYPE: dry, gravelly places, among clumps of scrub oak, end of road from T. Armendaiz north into Sierra del Pino, Coahuila, Aug. 20–26, 1940, *I. M. Johnston & C. H. Mueller*, 457 (G).

Known from southwestern Texas, and from Coahuila, San Luis Potosí and Tamaulipas, Mexico.—TEXAS. SCHLEICHER Co.: s. of Eldorado, Nov. 1, 1942, *H. R. Reed*, 40902, 40903 (G). EDWARDS Co.: Ranch Expt. Sta., pasture G, *V. L. Cory*, 5010 (G), Oct. 16, 1932, *V. L. Cory* 5011[1] (G). EL PASO Co.: Guadalupe Mts., Sept. 1881, *V. Havard* (US, 134404), 1881, *V. Havard*, 56 (US 220338). JEFF DAVIS Co.: side of hills, pass of the Limpia,[2] Aug. 24, 1849, *Exped. from West Texas to El Paso, C. Wright*, 246 (G, US); dry exposed slopes (alt. 1800 m.) Mt. Locke, Davis Mts., Sept. 1936, *L. C. Hinckley* (G); foothill on s. w. of Mt. Locke, Davis Mts., on road up to Observatory (alt. 1850 m.), Sept. 1936, *L. C. Hinckley*, 884 (NY). BREWSTER Co.: Pine Canyon (5000′), Chisos Mts., Sept. 5, 1937, *E. Marsh*, 330 (G); Chisos Mts., July 28, 1931, *C. H. Mueller*, 8176 (G, NY); Blue Creek, Chisos Mts., June 19, 1931, *C. H. Mueller*, 8176 (G); dry soil, in wide valleys, Chisos Mts., Aug. 20, 1915, *M. S. Young* (G); grassy slope of College Hill, Alpine, Sept. 20, 1935, *O. E. Sperry*, T. 354 (US); frequent on College Hill, Alpine, Aug. 20, 1936, *B. A. Warnock*, 1179 (G). NEW MEXICO. BERNALILLO Co.: dry flats, w. slope of Sandia Mts., near Allen's Ranch (alt. 7000′), Aug. 10, 1914, *Miss C. C. Ellis*, 284 (NY, US). MEXICO. COAHUILA: dry gravelly places among clumps of scrub oak, end of road from T. Armendaiz, north into Sierra del Pino, Aug. 20–26, 1940, *I. M. Johnston & C. H. Mueller*, 457 (G, type); Monclova, Feb.–Oct. 1880, *E. Palmer*, 419 (G); 100 mis. n. of Monclova, Feb.–Oct. 1880, *E. Palmer*, 420 (G, US); valle de los Guajes, e. of the Sierra de la Encantada, 10 mis. s. of Rancho Buena Vista, Sept. 3, 1941, *R. M. Stewart*, 1354 (G). TAMAULIPAS: in dry broad arroyo, 19 km. s. w. of Misquihuana, rd. to Palmillas, Aug. 11, 1941, *L. R. Stanford, K. L. Retherford & R. D. Northcroft*, 900 (G (3 stems to left), NY). SAN LUIS POTOSI: Sierra Mts., en route San Luis Potosi to Tampico, Dec. 1878–Feb. 1879, *E. Palmer*, 1085 (G); Bagre, Minas de San Rafael, July 1911, *C. A. Purpus*, 5144 (G, US).

Liatris punctata has probably the widest geographic range of any species of the genus, extending from about the 53rd parallel of latitude in the western Canadian provinces, southward into northern Mexico, though not east of the Mississippi. Hooker's description covers Drummond's specimen from the plains of Saskatchewan and that of Douglas from the Red River and

[1] This specimen is fasciated, probably as the result of some injury.

[2] In Gray, Plant. Wright. p. 83 (1852), no. 246, is stated to be from Pass of the Limpia, which is in Jeff Davis Co., Texas.

Eagle Hills, Sask., Aug. 4, 1827 (Kew), of which photographs have been seen. This plant, as it occurs in Canada from Manitoba to Alberta and for the most part in those states just south of the border (North Dakota, Montana and Wyoming) and southward along the eastern Rockies to New Mexico, closely resembles the type and is here called var. *typica*. A variety of more slender and often taller habit, with narrower leaves, and slightly smaller heads, occurs more generally in the plains states from the southern border of the Dakotas to the Oklahoma-Texas border-region, and is here separated as var. *nebraskana*.

Torrey and Gray (Fl. N. Amer. ii. 69 (1841)) recognized two varieties of which γ, described as having "leaves conspicuously ciliate with hispid hairs; inner scales of the involucre purplish above", probably belongs with var. *typica*, though the involucre is not necessarily colored. In contrast to var. γ, they recognized as var. β, plants with "leaves nearly all very narrowly linear; the margins remotely ciliate or naked; scales of the involucre narrower, tapering somewhat gradually into a cuspidate-acuminate point, at least the inner ones; spike usually short; stem often slender". Since the writers referred to collections of the Nicollet N. W. Expedition, by Charles A. Geyer (NY "var. β"), it is possible to recognize as this latter variety the one that occurs more generally in the central plains-states and we are calling it var. *nebraskana*. In the National Herbarium are two specimens of which one, of Aug. 20, 1839, Nicollet's N. W. Exped., no. 272, "var. γ", from the sandy and prairie heights, around the Sioux, lower St. Peter R., near "Fort Pierre" is apparently var. *typica*, as are also those at the Gray and New York Herbaria, without locality, labelled "var. γ" and "var. " respectively. Another specimen, with the rootstock 10 cm. long (of Aug. 20, 1839, Nicollet's N. W. Exped., no. 272, "fere var. β T. & G.", from sandy arid prairie heights, around the Sioux, Upper St. Peter R., near Fort Pierre (US)), as well as one "fere β" (G), represent the more slender variety in the character of the narrow leaves. However, by the size of the heads, and ciliate-margined phyllaries, they match var. *typica* of the western Canadian prairies. Thus the "fere var. β", may be translated as an intermediate between the two varieties. By the report and maps of this expedition (see footnote to citation), these specimens would have been collected

about Day Co., South Dakota. Thus it seems evident that both var. *typica* and var. *nebraskana* are represented in the collections of that expedition which reached a region where the range of the varieties overlap, and they had also apparently collected at that time an intermediate that was recognized by Torrey and Gray as "fere β". Certainly many specimens now justify considering variations from the type as a second variety.

In numerous specimens examined, wherever the subterranean stem is present, it is a long, often divided rootstock. Though not preserved on the specimens of Drummond and Douglas and therefore not mentioned by Hooker, it is quite characteristic of *L. punctata* from western Canada and southward, whether variety *typica* or *nebraskana*. This we believe helps to distinguish the species from the more southern ones with which it has been confused, namely *L. mucronata* and *L. angustifolia*, for they have somewhat globular corms.

In the prairie provinces of Canada specimens are readily identified as var. *typica* as they agree well with the type specimens of Hooker who described the phyllaries "margine ciliato, lanatis mucronato-acuminatis". Specimens from near the south end of the mountain range, as in Colorado and New Mexico, have very frequently phyllaries that are markedly mucronate and might, from observation of this character alone, suggest relationship to *L. mucronata*. However, some of them have leaves 2–4 mm. wide, with ciliate margin, and an elongate ramifying rootstock, belong to *L. punctata* and are definitely var. *typica*. Others are more nearly like var. *typica* than var. *nebraskana*, but are distinctive in having mucronate and short-ciliate, colorful phyllaries. Since specimen for specimen seen, *punctata* var. *typica* from western Canada shows lanceolate-acuminate phyllaries and from Colorado and New Mexico more frequently these mucronate ones, we are calling these latter, *forma coloradensis*.

In the central plains-states of Nebraska, Kansas, and Oklahoma, the great majority of specimens seen are var. *nebraskana*. For example, only three specimens of var. *typica* have been seen from Nebraska, and in Kansas only from the counties on the western border along Colorado. The counties listed for specimens examined from this state are curiously enough classified as follows: 6 (of which 5 are from the western border) for var. *typica*,

9 (all from the central to the eastern part of the state) for var. *nebraskana*, and 5 (Riley, Graham, Ellis, Ellsworth, and Kiowa) rather central, for questionable intermediates. J. N. Rose and W. R. Fitch, crossing the state, seem to have collected on Sept. 14, 1912, in the vicinity of Syracuse, Hamilton Co. (US) (i. e. on the Colorado border), var. *typica* and on Sept. 23, 1912, in the vicinity of Pratt, Pratt Co. (US) (i. e. along the central southern border of the state) var. *nebraskana*, or an intermediate.

There are, however, many specimens which are not readily placed varietally. As frequently happens where the range of two species or varieties overlap, there are apparent intermediates. Thus in the states marginal to the range of each variety of *L. punctata* the number of doubtful specimens increases, and a list of these, A, is given below. Frequently it is difficult also to allocate specimens because they seem to be just intermediate between two species. From a region like Oklamona, where the range of *L. mucronata* overlaps that of *L. punctata*, and the plains variety *nebraskana* and forma *coloradensis* of var. *typica* of the latter species meet, come more specimens that are puzzling intermediates. Often specimens of the same collector's number and date in different herbaria will favor different interpretations. While it is impossible to make definite decisions when the rootstock is not present, as is often the case in herbarium specimens, still, though lacking the association of rounded or elongate rootstock with other recognized specific characters, there is evidence that this is a region of much hybridization. List A & B below give some of the intergradations.

A. Intermediates of *Liatris punctata* Hook var. *typica* & var. *nebraskana*. MICHIGAN. Kalamazoo Co.: prairie roadside, ½ mi. n. e. of Schoolcraft, Aug. 14, 1936, *C. R. Hanes*, 3646 (G); ½ mi. n. e. of Schoolcraft, Aug. 7, 1937, *C. R. Hanes*, 3887 (NY); prairie along roadside, ½ mi. n. e. of Schoolcraft, Aug. 1, 1938, *C. R. Hanes*, 308 (NY). MINNESOTA. Clay Co.: Moorhead, Aug. 15, 1901, *C. A. Ballard*, 3154 (G). Otter Tail Co.: Battle Lake, Aug. 1892, *E. P. Sheldon* (G, US); dry hills and sandy soils, Fish Lake, Sept. 2, 1907, *Z. L. Chandonnet* (US). Hennepin Co.: Fort Snelling, Aug. 22, 1883, *W. H. Manning* (G), Sept. 21, 1890, *E. A. Mearns*, 140 (US). Wabasha Co.: Lake City, Aug. 29, 1883, *W. H. Manning* (G); Liberty, Aug. 29, 1883, *W. H. Manning* (G). IOWA. Co. undetermined: western Iowa, 1872, *H. H. Babcock* (US). Emmet Co.: prairies, *Herb.*

M. Bebb, R. I. Cratty (G). Palo Alto Co.: gravelly prairie knoll, Lost Island Twsp., Sect. 20, Aug. 27, 1934, *Miss A. Hayden*, 10530 (G, NY); gravelly prairie in cemetery at Dickens, Aug. 4, 1934, *Miss A. Hayden*, 10528a (G). NORTH DAKOTA. Benson Co.: Butte, Aug. 26, Sept. 29, 1907, *J. Lunell* (NY). Stark Co.: Dickinson, Sept. 18, 1908, *W. R. Holgate* (NY). Morton Co.: Mandan, 1915, *J. T. Jarvis*, 160 (US). Richland Co.: prairie, Hankinson, Aug. 25, 1902, *C. O. Rosendahl*, 1147 (NY). SOUTH DAKOTA. Without stated locality, probably Day Co.: sandy, arid prairie heights, around the Sioux, upper St. Peter R., near Fort Pierre, dividing ridges between Missouri & Mississippi waters, 1839, *Nicollet's N. W. Exped.* "fere β" (G); Aug. 20, 1839, *Nicollet's N. W. Exped. C. A. Geyer*, 272 ("fere β T & G" (US)). Meade Co.: Black Hills, near Fort Meade, Aug. 10, 1887, *W. J. Forwood* (US); Park, near mouth of Gimlet Creek, Aug. 4, 1910, *J. Murdock* (G, NY). Fall River Co.: on prairie in canyon bottom, n. w. of Hot Springs, Aug. 6, 1941, *G. J. Goodman*, 3300 (G, NY). Yankton Co.: on high unbroken prairies, Jamesville, Aug. 24, 1899, *L. A. Bruce* (US). NEBRASKA. Keyapaha Co.: Carns, Aug. 24, 1893, *F. Clements*, 2902 (G, US). Thomas Co.: on sandhills, Middle Loup R., near Thedford, Sept. 13, 1893, *P. A. Rydberg*, 1761 (G, P); near Plummer Ford, Dismal R., Aug. 22, 1893, *P. A. Rydberg*, 1761 (US). Deuel Co.: without stated locality, Aug. 1890, *P. A. Rydberg*, 138 (NY). Kearney Co.: Minden, Sept. 5, 1920, *Dr. Hapeman* (G). KANSAS. Riley Co.: Manhattan, Sept. 1, 1892, *S. Norton* (NY); Fort Riley, Sept. 1892, *E. E. Gayle*, 603 (NY). Graham Co.: Bogue, Sept. 8, *R. H. Imler* (US). Ellis Co.: rocky prairie soil, w. of Hays, June 20, 1927, *E. Bondy* (G, US, O). Ellsworth Co.: Kanapolis, Aug. 27, 1891, *E. O. Wooton* (US). Kiowa Co.: Belvedere, Sept. 5, 1898, *M. White* (US).

B. Intermediates of *Liatris punctata* Hook & *Liatris mucronata* DC. KANSAS. McPherson Co.: McPherson, Sept. 5, 1890, *W. A. Kellerman* (US). OKLAHOMA. Woods Co.: Alva, Oct. 1913, *G. W. Stevens*, 2866 (G); prairie, Alva, Sept. 28, 1913, *G. W. Stevens*, 2851 (G, NY, US, O); Augusta, Oct. 12, 1896, *U. S. Geol. Survey, L. F. Ward*, 51 (US). Tulsa Co.: prairie, near Tulsa, Oct. 30, 1913, *G. W. Stevens*, 2982 (G). Pawnee Co.: Pawnee, Aug. 30, 1895, *J. W. Blankinship* (G). Oklahoma Co.: near Oklahoma City, Sept. 16–17, 1938, *S. S. White*, 1156 (G). Beckham Co.: 6 mis. s. of Elk City, Oct. 17, 1936, *C. T. Eskew*, 1505 (US). Comanche Co.: Fort Sill, Aug. 28, 1916, *Mrs. J. Clemens* (G); prairie, w. of Wichita National Forest, Oct. 10, 1936, *C. T. Eskew*, 1429 (G, NY, US, O). Harmon Co.: bad lands, eroded sand-stone & gypsum desert, Oct. 24, 1936, *M. Hopkins*, 1055 (G, NY, O). TEXAS. Hutchinson Co.: 5.9 mis. n. of Borger, Sept. 29, 1936, *H. B. Parks & V. L. Cory*,

16338 (T). CLAY Co.: 13 mis. n. e. of Henrietta, Oct. 20, 1940, *V. L. Cory*, 40761 (G, US). LUBBOCK Co.: vicinity of Lubbock, *E. L. Reed*, 3162 (US); vicinity of Lubbock, *E. L. Reed*, 3178 (US). EL PASO Co.: Guadalupe Mts., Aug. 22, 1901, *V. Bailey*, 700 (US).

Allowing for the modification to mucronate phyllaries in southern *L. punctata* var. *typica* forma *coloradensis*, specimens from the mountains of New Mexico are predominantly *typica*. Of all the specimens I have seen from New Mexico, none show a markedly interrupted spike with long internodes between larger heads, although there is a suggestion of it in one collection by Miss C. C. Ellis, no. 284, from the Sandia mountains (NY, US). This character is noticeable in specimens from the Guadalupe and Davis mountains of the Trans-Pecos region of western Texas where slightly varying plants of *L. punctata* are of tall habit with lax spike of fewer distant heads and with fewer leaves. Gray (Pl. Wright. 83 (1852)) refers to one of Wright's specimens as follows: "no. 246 *Liatris punctata* Hook . . . This is one of the narrower-leaved forms with the scales of the involucre very obtuse and abruptly mucronate. *L. mucronata* DC. (founded on Berlandier's no. 1926) is a similar but more depauperate state of the same species." Examination of this collection, from Pass of the Limpia, Jeff Davis Co., Texas (G), shows one rather better specimen to have about 25 heads distributed over 30 cm. giving quite an interrupted spike. From the Chisos mountains of Brewster county and the adjoining northwestern region of Coahuila, Mexico, come specimens with interrupted spike and broader, almost glabrous leaves and an obese, oval rootstock. Until further collections have been made we group these specimens from the southernmost mountain localities as *L. punctata*, var. *mexicana*.

Not to be confused with these, however, though also showing loose interrupted spikes, are plants from the more eastern plains of Mexico, in Tamaulipas, and northeastern Coahuila. These are tall, more slender plants with narrow leaves and mucronate phyllaries and shorter corolla-tubes and pappus that associate them with *L. mucronata*, as it is seen from Frio, San Patricio and Duval counties of the Rio Grande plains of Texas. The rootstock is generally globular as seen in typical *L. mucronata* DC. but may be ovoid, suggesting that there may here too be intermediates be-

tween the two species reaching their southern limit of range. We have placed this material as *L. mucronata* var. *interrupta*.

L. punctata has established as good a foothold, if not a better one, in the northern and mountainous latitudes as *L. ligulistylis*, the only other species in Western Canada. Then, abounding along the eastern Rockies, it occurs southward in New Mexico, El Paso, Jeff Davis and Brewster counties, Texas, at a height of 5000 feet or more and "peters out" in northern Mexico in the varietal form (var. *mexicana*). What Kearney and Peebles state in Arizona Flowering Plants and Ferns (1942, p. 9) would perhaps be expected of *Liatris punctata:* "Many species of this category [i. e. of Rocky Mt. distribution] range from the Canadian Rockies to the Sierra Madre in northern Mexico. . . . The higher mountains of Arizona and the elevated plateaus in the northern parts of the state offer congenial habitats for the characteristic plants of this category". Yet strangely no collections of this or any other species of *Liatris* from the state of Arizona have been found in any herbaria examined. *Liatris punctata*, though not crossing the Rockies, made a very successful encroachment on their eastern slopes.

Liatris cylindrica Torr. (Ann. N. Y. Lyceum ii. 210 (1827)) obviously equals *Liatris cylindracea* Michx. as to name (as shown by reference to Flor. Bor. Amer. and to the correct page of it) but not as to plant. The specimen of Dr. James, of Long's 1st Expedition (NY), to which Torrey referred, proves to be *L. punctata* var. *typica*, but is without locality of collection. Its source then is doubtful; in the list it is given as "sources of the Platte?". This would be too far west for *L. cylindracea*. Torrey made the observation "Dr. James' specimen resembles those collected by Captain Douglas in Cass' expedition except in not being above ten inches high with the leaves hairy on the margin"; that collection Torrey (Am. Jour. Sci. & Arts iv. 66 (1822)) referred to *L. squarrosa*. This should, however, not prove too confusing since Captain Douglas' material came from the west shore of Lake Michigan and may very well have been *L. cylindracea*. Elliott, indeed (Sk. ii. 276 (1824)), refers to specimens of that species from that locality received from Torrey. It therefore seems clear that Torrey intended to call the James specimen *L. cylindracea*, but the locality given in the text is unlikely for that species

and it does suit *L. punctata*, which the specimen actually is. Gray, Synop. Fl. i². 110 (1884), also makes *L. cylindrica* Torr. synonymous with *L. punctata*.

That *L. punctata* crosses with species of other series, as of the *Scariosae*, is seen in × *L. Weaveri* Shinners (see no. 18) and in the following hybrid.

× LIATRIS FALLACIOR (Lunell) Rydb. emend. Shinners. Stems single from an elongate (over 5 cm. long), horizontal rootstock, 3.5–6 dm. tall, mostly green with scattered pubescence basally, which becomes more dense above, of long white appressed hairs; leaves linear, also softly pubescent with margins asperous due to short cilia about as in *L. ligulistylis;* basal leaves 8 cm. long and 3 mm. wide, gradually narrowing to become bracts subtending the heads: inflorescence an irregular spike, 8–20 cm. long, or in slender specimens reduced to but a few (2–5) heads with the terminal one in all specimens markedly larger than the axillary ones (usually 2–3 times, but in one specimen, that of Lunell no. 1016, 4–5 times as large): heads generally 14–18-flowered, and slightly turbinate, ca. 1.5 cm. wide and high, at the time of flowering; phyllaries narrow, oblong and obtuse, mostly green with narrow colorful petaloid margins fringed with distinct cilia (in the cotype there is slight evidence of a somewhat acute cusp disappearing behind the blunt tip); corolla 8–9 mm. long, moderately pilose within; achene ca. 5 mm. long; pappus 7–8 mm. long and plumose though less conspicuously so than *L. punctata*.—Fl. Prairies and Plains, 780 (1932); Shinners, Amer. Midl. Nat. xxix. 40 (1943). *Laciniaria fallacior* Lunell, Amer. Midl. Nat. v. 38 (1917). *Laciniaria fallacior* var. *celosioides* Lunell, l. c.—NORTH DAKOTA. BENSON CO.: on sunny, dry prairie, Leeds, Sept. 15, 1916, *Lunell*, 1015 (TYPE of *Laciniaria fallacior*), 1016 (TYPE of *Laciniaria fallacior* var. *celosioides*).

Known only from the type (2 plants on sheet) and cotype (3 plants on sheet) of Lunell's collection in North Dakota. These few specimens clearly show an intermediacy between *Liatris punctata* and *L. ligulistylis*. In the elongate, horizontal rootstock, narrow linear leaves, general spike-like inflorescence, the narrow-oblong shape of the phyllaries and the plumose (though not markedly so) pappus they resemble the former parent. In contrast the general pubescence of leaves and stem (especially that of the inflorescence-rachis), the large terminal heads and their development almost to the exclusion of others in several specimens, the obtuse tip and the slightly petaloid margin of the phyllaries and the length of the achene and pappus are more

similar to *L. ligulistylis*. The complete effect is that of a very marked blending of the characters of two species, belonging in the two sections *Suprago* and *Euliatris*, with barbellate and plumose pappus respectively and this is interestingly enough seen in an intermediacy in the extent of plumosity in the resultant hybrid.

The type specimen of Lunell's var. *celosioides* differs in no way except that it shows an unusually large congested terminal head, a result of some fasciation.

25. Liatris **densispicata** (Bush), comb. nov. Stems many, slender, glabrous, 3–6 dm. high, from an elongate rootstock that runs horizontally in the sand, giving off clusters of aerial stems; leaves numerous, punctate, glabrous, narrowly linear, soft and ascending, 5–10 cm. long, 1–2 mm. wide, gradually shortening to the bracts of the flowering spike: inflorescence 10–30 cm. long, usually of densely crowded, sessile, narrow cylindrical heads of 3–8 flowers and 8–12 mm. long; phyllaries herbaceous, oblong-lanceolate, acute- or acuminate-tipped, without or with a few marginal cilia; flowers purple, corolla 10–11 mm. long, tube pilose within; pappus 9 mm. long, plumose; achenes 8 mm. long.—*Lacinaria densisipicata* Bush, Amer. Mid. Nat. xii. 313 (1931). *Lacinaria arenicola* Bush, Amer. Mid. Nat. xii. 314 (1931).

Type from Bunker prairie, Anoka Co., Minnesota. Known only from that state.—Anoka Co.: sand-dunes, Bunker Prairie, Aug. 26, 1927, *C. O. Rosendahl*, 5421b (M, type), 5420 (M, type of *Lacinaria arenicola*). Hennepin Co.: Minneapolis, Aug., 1868, *W. M. Canby*, 541, 542 (US), Sept. 15, 1891, *J. H. Sandberg*, 933 (US).

This species seems distinct from *L. punctata*, var. *typica* and var. *nebraskana*, which are found in Minnesota, by the generally finer and more slender structure of stem, spike and leaves. In these characters it recalls *L. angustifolia*, which is mostly confined to Texas, though rarely collected in southern Missouri, Nebraska and Kansas. Its long, horizontal rhizome, however, indicates that the Minnesota locale is not just an isolated northern station of the latter species.

Lacinaria arenicola Bush, described from plants from the same type region, collected also by C. O. Rosendahl, seems indistinguishable in any marked character and represents probably a less vigorous and poorly nourished plant in which some heads have not developed, thus giving the irregular spike shown in the type sheet. Dr. Rosendahl, who also collected plants for the writer from the same region, was unable to make any distinctions.

26. LIATRIS MUCRONATA DC. Corm round, about 2–4 cm. in diameter, bearing a number of stems, mostly glabrous, rarely hirsute, 3–7 dm. in height, often reddish in color, with numerous narrowly linear, punctate leaves, mostly without marginal cilia (occasionally hirsute when accompanying a hirsute stem); basal leaves 5–8 cm. long and 1.5–5 mm. wide, diminishing upwards to short bracts often exceeding the heads of the lower portion of the spike-like inflorescence of usually crowded, sometimes scattered, heads, 8–30 cm. long; heads cylindrical, 1.2–1.8 cm. long (measured to the end of the pappus), of 4–6 flowers; phyllaries herbaceous, outermost ones short, ovate-lanceolate with mucronate tips, becoming longer inwards, the innermost 9–11 mm. long by 2–3 mm. wide, oblong, with midvein prominent, abruptly mucronate to cuspidate and with margin finely ciliolate or but membranaceous; corolla purple, 9–10 mm. in length, only moderately pilose in the base of the tube; filaments sometimes pilose; pappus 6–7 mm. long, plumose; achene 5.5–7 mm. long, ribbed and hairy.—Prodr. v. 129 (1836).

Var. **typica.** Inflorescence a dense spike of closely crowded heads 1.2–1.5 cm. long; more general throughout the species-range. *L. mucronata* DC. Prodr. v. 129 (1836) sens. strict.; Engelm. & Gray, Pl. Lindh. i. 10 (1845); Torr. & Gray, Fl. N. Amer. ii. 69 (1841); not sensu Gray, Plant. Wright. 83 (1852). *Liatris acidota* var. *mucronata* Gray, Synop. Fl. i². 110 (1884). Probably *Lacinaria leptostachya* Bush, Amer. Mid. Nat. xii. 314 (1931).

Chiefly in Texas, from the eastern hardwood forest region westward through the Edwards plateau, with a few stations scattered northward through the plains region of Texas into Oklahoma, Kansas and Missouri.—MISSOURI. ATCHISON Co.: dry ground, Oct. 1, 1893, *B. F. Bush*, 198 (G, US). BARRY Co.: Eagle Rock, June 22, 1897, *B. F. Bush*, 118 (US). KANSAS. SEWARD Co.: vicinity of Liberal, Sept. 23, 1912, *J. N. Rose & W. R. Fitch*, 17149 (2 stems) (NY). OKLAHOMA. KINGFISHER Co.: Huntsville, Sept. 20, 1895, *Miss L. A. Blankinship* (G). OKLAHOMA Co.: sandy clay on sandstone hillside, 2½ mi. w., ½ mi. n. of Spencer, Aug. 6, 1939, *U. T. Waterfall*, 1552 (G). BECKHAM Co.: prairie, Cedar Twsp., Oct. 18, 1936, *C. T. Eskew*, 1509 (US, O). TEXAS. Co. undetermined: rocky prairies, Colorado to Guadaloupe, July, 1845, *Lindheimer* (G). POTTER Co.: Templin, 1927, *V. L. Cory*, 2521 (G). HARDEMAN Co.: abundant on prairies, Chillicothe, Sept. 27, 1906, *C. R. Ball*, 1151 (NY, US). BAILEY Co.: grassy hillsides, 2 mis. s. of Muleshoe, Aug. 24, 1921, *R. S. Ferris & C. D. Duncan*, 3428 (NY). GRAYSON Co.: Denison, Oct. 15, 1932, *Savage* (NY); Bonham to Sherman, Aug. 28, 1939, *B. C. Tharp* (G). DENTON Co.: prairie on Houston clay, between Denton &

Aubrey, Oct. 6, 1937, *W. L. McCart*, 674 (US). KAUFMAN Co.: vicinity of Terrell, May 8, 1904, *F. J. Tyler* (US). DALLAS Co.: Dallas, Aug. 15, 1875, *J. Reverchon* (G); dry soil, Dallas, Sept. 1877, *J. Reverchon* (NY); rocky bluffs, Dallas, Aug.–Sept. *J. Reverchon, ex Herb. Curtiss*, 1180 (G, NY); Dallas, 1875, *J. Reverchon*, 15 (US); Dallas, Sept. 26, 1900, *B. F. Bush*, 1112 (G). TARRANT Co.: without stated locality, Oct. 10, 1925, *A. Ruth*, 78 (NY). PARKER Co.: Weatherford, Oct. 18, 1902, *S. M. Tracy*, 8143[1] (US). HOOD Co.: dry calcareous soil, Comanche Park, Sept. 15, 1914, *E. J. Palmer*, 6541 (US). CALLAHAN Co.: rocky open ground, Baird, Sept. 30, 1918, *E. J. Palmer*, 14555 (US). ANDERSON Co.: alt. 300′, Sept. 20, 1937, *G. L. Fisher*, 37168 (US). BROWN Co.: Brownwood, Oct. 23, 1916, *E. J. Palmer*, 11106 (US). LAMPASAS Co.: 8 mis. n. w. of Lampasas, Sept. 23, 1935, *H. B. Parks & V. L. Cory*, 15692 (T). REAGAN Co.: 11 mi. n. w. of Stiles, Nov. 18, 1942, *V. L. Cory*, 40954 (G). WILLIAMSON Co.: Georgetown, Aug. 1929, *M. D. Cody* (F). LLANO Co.: Enchanted Rock, Oct. 12, 1930, *Miss E. Whitehouse* (G). TRAVIS Co.: dry calcareous soil, open ground, Austin, Sept. 21, 1916, *E. J. Palmer*, 10766 (US); Austin, Sept. 11, 1877, *L. F. Ward* (US); near Austin, Oct. 11, 1940, *R. R. Innes*, 105 (G). BLANCO Co.: 6¼ mis. n. of Blanco, Sept. 23, 1935, *V. L. Cory*, 15691 (G). SUTTON Co.: Roy Hudspeth's, Sept. 3, 1938, *V. L. Cory*, 2520 (G); Schoolhouse Hill, Sonora, Sept. 12, 1942 (no. 40175), Oct. 27, 1942 (no. 40828) *V. L. Cory* (G). AUSTIN Co.: San Felipe (Austin) Jan. 1835, *T. Drummond*, 122 (G, NY). HAYS Co.: San Marcos & vicinity, 1898, *S. W. Stanfield* (NY). KERR Co.: Kerrville, Oct. 4, 1916, *E. J. Palmer*, 10896 (US). Comancheries (KERR & KENDALL Co. probably) from Boerne to Comfort, Nov.–Dec. 1828, *Berlandier*, 1926 (G, isotype). Ex prov. Mex. 1839, *ex Herb. Musei Britanici* (US). COMAL Co.: Comanche Spring, New Braunfels, Sept., 1849, *Lindheimer* 940 (G, NY, US, P), Sept., 1850, 941 (G, NY, US, P, O), 1849–53, 942 (G, NY, US), Sept., 1850, 943 (G, NY, US, O). BEXAR Co.: 3 mi. southwest of Smithson Valley, Sept. 23, 1935, *H. B. Parks & V. L. Cory*, 15687 (T); vicinity of San Antonio, Oct. 19, 1912, *J. N. Rose*, 18016 (US), Sept. 3, 1921, *Miss E. D. Schultz*, 610 (US), *G. Jeremy*, 39 (G), Aug., 1937, *Sister Mary C. Metz*, 3030 (NY).

Var. **interrupta,** var. nov., a varietate typica differt spicis interruptis, capitibus 1–3 cm. inter se distantibus 1.5–1.8 cm. longis.—TYPE from south of Mathis, San Patricio Co., Texas, Oct. 20, 1927, *J. N. Rose & P. G. Russell*, 24156 (G).

Tamaulipas, San Luis Potosí, and northeastern Coahuila, Mexico, and some of the bordering counties of Texas.—TEXAS.

[1] The specimens at G, NY & T. might be considered intermediates between *mucronata* and *angustifolia*.

Without stated locality: *Drummond* (G). Oldham Co.: Bravo, Oct. 7, 1909, *C. R. Ball*, 1593 (US). Randall Co.: Palo Duro Canyon, Sept. 2, 1907, *C. R. Ball*, 1217 (NY, US). Bexar Co.: San Antonio, Sept. 3, 1921, *Miss E. D. Shultz*, 610 (US). Uvalde Co.: Uvalde to Hondo, Oct. 10, 1936, *B. C. Tharp* (G). Frio Co.: 14 mis. s. of Pearsall, Sept. 18, 1939, *F. Shreve*, 9442 (G). San Patricio Co.: s. of Mathis, Oct. 20, 1927, *J. N. Rose & R. G. Russell*, 24156 (G, type, NY, US). Duval Co.: San Diego, 1884–1888, *Miss B. Croft*, 21 (NY, US). MEXICO. Coahuila: Sierra de Santa Rosa, s. of Musquiz, July 13, 1938, *E. G. Marsh*, 1290 (G); Palm Canyon, Musquiz, Sept. 19, 1936, *E. G. Marsh*, 965 (G); Del Carmen Mts., Sept. 7, 1936, *E. G. Marsh*, 792 (G); Rancho Aqua Dulce, Musquiz, July 1, 1936, *F. L. Wynd & C. H. Mueller*, 399 (G, US). Tamaulipas: sierra near San Lucas, Jaumave, July, 1932, *H. W. Von Rozynski*, 520 (3 stems to right) (NY).

Liatris mucronata has been passing as *Liatris punctata* or, as explained (see no. 4), has been erroneously appended to *Liatris acidota* as a variety. The differences between *L. mucronata* and *L. acidota* have already been noted under the latter species.

The type of *L. mucronata* was collected Nov.–Dec. 1828, by Berlandier, no. 1926, from the Comancheries orientales, Texas (Geneva) while that of *L. punctata* (Kew) was collected on the plains of Saskatchewan. Though the type plant in Geneva has not been seen, a photograph of it and an isotype in the Gray Herbarium have been compared. In neither is there any rootstock present. Engelm. & Gray (Pl. Lindh. i. 10 (1845)) clearly recognized the species, when describing the new species *L. acidota*, and referred to Lindheimer's collections of both species They included in the description of *L. mucronata* "caudice globoso." Other specimens collected from Texas, similar in other characters to *L. mucronata*, show that a globose or rounded corm is characteristic of this species in contrast to the elongate and often branched rootstock of *L. punctata*. The two species in their type regions differ also in the nature of the phyllaries which are abruptly mucronate and cuspidate in this species, rather than lanceolate-acuminate as in *L. punctata* from the western Canadian provinces. *L. mucronata* has also a shorter pappus, a character in which, as in the globular rootstock, it shows resemblance to *L. angustifolia*.

However, variations occurring in *L. punctata* over its great north-south range, undoubtedly help to explain some of the con-

fusion of these two species. As stated under *L. punctata* (see no. 24), mucronate phyllaries, rather than long lanceolate-acuminate ones are common in f. *coloradensis* from the southern end of the range in Colorado and New Mexico. In the regions between these states and Texas, there are plenty of specimens giving evidence of a blending of the characters of *L. punctata* and *L. mucronata*. Thus from the northern plains of Texas, from Oklahoma, Nebraska and Kansas come perplexing specimens which may represent intermediates between the two. Certainly when lacking rootstocks, as frequently happens, specimens are difficult to determine. So far, in southern Texas from the eastern border through the counties of the hardwood forest, blackland prairie, Edwards plateau and Rio Grande Valley, where *L. mucronata* abounds, no specimens with a long ramifying rootstock have been seen. From the northern plains of Texas, only one specimen has been seen, *H. B. Parks and V. L. Cory* from 5.9 mi. n. of Borger, Hutchison Co. (which is close to the Oklahoma border), Sept. 29, 1935, no. 16338 (T), which has an elongated rootstock along with mucronate phyllaries that suggest *L. punctata* f. *coloradensis*. For other specimens, as in the list of intermediates, it has been less easy to make specific determinations.

As quoted, in the discussion of *L. punctata*, Gray compared what was probably the only specimen he had from the El Paso region of Texas (Chas. Wright's no. 246 (G)) with *L. mucronata* because of its obtuse and abruptly mucronate bracts. No rootstock is present on the specimen. Yet it shows few heads separated by long internodes, in contrast to the quite dense spike-like arrangement in the type of *L. mucronata*, which Gray considered a "more depauperate state" of *L. punctata*. Gray's opinion may have contributed further to the uncertainty of the determination of this species. Sufficient specimens have now been seen to refute the idea that *L. mucronata* DC. is just a depauperate form of L. *punctata*. Also such an interrupted spike as is seen in Wright's specimen of *L. punctata* is found in the most southern phase of *L. punctata*—var. *mexicana*.

A plant that has so far been collected very rarely from the coastal plain region of Texas, with few large heads of 8–10 flowers, often singly disposed along stems that may branch, and having longer achenes and pappus, seems a greater variant, and is here given specific rank as *L. bracteata*.

L. mucronata is to be distinguished from *L. angustifolia*, which occurs with it through Texas and casually resembles it, by the smaller heads with glabrous bracts and the softer smooth leaves, though here again there may be found intermediates, e. g., *S. M. Tracy*, No. 8143 from Weatherford, Parker Co., Texas, Oct. 18, 1902 (NY and T) (see discussion under *L. angustifolia*).

27. Liatris **angustifolia** (Bush), comb. nov. Stems slender, glabrous, 6–8 dm. high, often reddish in color, from a globose corm usually 2–4 cm. in diameter: leaves narrowly linear, soft, epunctate or hardly at all punctate; basal ones 5–10 cm. long, 1–3 mm. wide, reduced progressively in length below a short spike to short bracts subtending the heads, but in longer spikes only so shortened throughout its length: inflorescence slender, 20–60 cm. long, of densely crowded heads, 8–16 mm. long, sessile or rarely becoming pedunculate, as following injury: heads slender, cylindrical, 3–6-flowered, ca. 1.5 cm. in length; phyllaries lanceolate, outer ones broader, inner ones narrower, acuminate, thin-papery, glabrous with merely membranous or slightly ciliolate margins in exceptional cases, somewhat glutinous; flowers purple, corolla 9–10 mm. long, slightly pilose within on the tube and noticeably so on the filaments of the stamens; pappus ca. 7 mm. long with lateral cilia more than fifteen times the diameter of the seta though not long-plumose; achenes 5–7 mm. long.—*Lacinaria angustifolia* Bush, Amer. Mid. Nat. xii. 315 (1931).

From the inner margin of the coastal plain region of Texas, northward and westward through the plains region into Oklahoma and occasionally Kansas, Nebraska, Arkansas and Missouri.—MISSOURI. Barry Co.: rocky slopes, bald knobs, along Mo.-Ark. line, Eagle Rock, July 27, 1926, *E. J. Palmer*, 31455 (G). NEBRASKA. Dawes Co.: Crawford, Aug. 13, 1896, *E. N. Plank* (NY). Cass Co.: prairies, Weeping Water, 1888, *T. A. Williams* (US). KANSAS. Riley Co.: Manhattan, Aug. 30, 1892, *S. Norton* (NY). Miami Co.: Paola, Aug. 1883, Aug. 1885, *Dr. Oyster*, 3503 (NY). Sumner Co.: high prairies, Caldwell, Sept. 10, 1890, *B. B. Smyth*, 279 (NY, US). OKLAHOMA. Creek Co.: along rwy. w. of Sapulpa, Sept. 6, 1913, *F. W. Pennell*, 5378 (NY). Cleveland Co.: 10 mis. e. of Norman, Aug. 20, 1903, *A. H. Van Fleet* (US); Denver, Little River, Aug. 21, 1903, *A. H. Van Fleet* (O). Pittsburg Co.: meadow, Sept. 22, 1934, *J. E. McClary* (O). Murray Co.: Platt National Park, *G. M. Merrill & W. A. Hagan*, July 16, 1935, 924 (NY, US, O); Sept. 30, 1935, 1535 (NY, O); near Sulphur, Aug. 5, 1939, *H. Broadbent* (O). Choctaw Co.: prairies, Fort Towson (Arkansas. *Dr. Leavenworth*) (G, NY).

TEXAS. Fannin Co.: (plant to right), Bonham, Sept. 21, 1877, *L. F. Ward* (US). Grayson Co.: Denison, Sept. 13, 1906, *F. J. Tyler* (US). Tarrant Co.: dry soil, Fort Worth, Sept. 5, 1912, *A. Ruth*, 78 (M, 211347 type); rocky lands, Fort Worth, July 30, 1909, *A. Ruth*, 78 (US); without stated locality, Sept. 1898, *A. Ruth*, 78 (US). Dallas Co.: hills, Dallas, Sept. 26, 1900, *B. F. Bush*, 1112 (NY, US); vicinity of Dallas, June 20, 1929, *Miss M. R. Stephenson*, 129 (US); rocky bluffs, Dallas, 1880, *J. Reverchon* (US). Kaufman Co.: Preston Bend, Sept. 16, 1906, *F. L. Tyler* (US). Somervell Co.: Paluxy valley, 6 mis. above Glen Rose, Oct. 11, 1891, *L. F. Ward* (US). Coryell Co.: rocky hillside, near Elige, Aug. 14, 1931, *S. E. Wolff*, 3269 (US). San Augustine Co.: San Augustine, *G. L. Crockett* (US). Blanco Co.: 10 mis. s. of Blanco, Sept. 23, 1935, *V. L. Cory*, 15683 (G). Gillespie Co.: Half Moon, *G. Jermy*, 806 (US). Harris Co.: Houston, Nov. 2, 1913, *G. L. Fisher*, 501 (US). Kendall Co.: Spanish Pass, Aug. 26, 1936, *V. L. Cory*, 19382 (G); 6 mis. n. w. of Boerne, Sept. 22, 1936, *V. L. Cory*, 20703 (G). Comal Co.: New Braunfels, July 1846, *F. Lindheimer* (US).

This species can be distinguished from *L. acidota* (with long basal leaves, looser, narrower spike lacking noticeable subtending bracts because of the abrupt reduction of the leaves basally to setaceous bracts leaving a strict almost naked stalk) by its spike of densely crowded heads with bracts progressively shortened from the uppermost of a gradually diminishing series of leaves. Also, the range of *L. acidota* is limited to the coastal plains region of Texas, whereas this species occurs back of the coastal plain. As Bush states of *Lacinaria angustifolia*, "This is the species, I have no doubt, that has been the basis of Missouri, Kansas, Oklahoma and Arkansas being cited as part of the range of *L. acidota*."

Bush described *Lacinaria angustifolia* as having "involucral bracts ovate-lanceolate, pointed or cuspidate, densely pubescent on the backs, ciliate on the margins, not punctate". Examination of the type specimen (no. 211347 Minn.) from a cultivated individual, grown in the greenhouse from seeds of Texas plants, failed to show that the phyllaries are pubescent; but as they are lanceolate-acuminate and as the specimen otherwise compares well with the species here in mind, Bush's name has been taken up.

Among the citations given by Bush l. c. for this species is *A.*

Ruth, no. 78, Tarrant Co., Texas, Sept. 5, 1912 (Ruth Herbarium). A specimen of this collection at the Herbarium of the University of Minnesota, sheet no. 211348, is the given type of Bush's *Lacinaria Ruthii* (Amer. Mid. Nat. xii. 316–17 (1931)). The description of that species is not so very different from that of *angustifolia* though the involucral bracts are given as "oblong, cuspidate or pointed, slightly ciliate on the margins, glabrous". Examinations of the type specimen and duplicates thereof (G, NY) as well as other specimens seen from Texas (e. g. Oct. 25, 1917, *A. Ruth*, no. 736, from sandy woods, near Fort Worth, Tarrant Co. (NY), Oct. 18, 1902, *S. M. Tracy*, no. 8143 from Weatherford, Parke Co. (G, NY, T)) suggest an intermediate condition between *Liatris mucronata* and *L. angustifolia*. The former covers much the same range as *L. angustifolia*. In the characters of spike, corolla, pappus and achene it also resembles it but the phyllaries have a prominent midrib that becomes a distinct cusp. Because the leaves of *L. angustifolia* are not distinctly punctate and are soft and pliable, they are usually distinguishable from those of equally narrow-leaved specimens of *L. mucronata*, which varies from a narrowly to a rather broadly (15 mm. wide) linear leaf and is occasionally hirsute. However, as the centre of range for both of these species lies in central Texas there are found confusing intermediates between them.

From *L. punctata* var. *nebraskana*, *L. angustifolia* is especially distinguishable by the rounded rather than elongate rootstock, the shorter corolla and pappus and the shorter lateral setae of the pappus making it seem short-plumose by comparison. The difference between the two is well shown on one sheet (NY) having a specimen with rootstock from Manhattan, Kansas, Aug. 30, 1892, *S. Norton* (NY), representing *L. angustifolia*, and a fasciated stem only (without rootstock) Sept. 1, 1892, representing *L. punctata* var. *nebraskana*. That the two intergrade seems quite possible. When examining a number of collections of B. F. Bush of different dates, from an isolated area like that of the mounds, Holt Co., Mo. (see list below) it seemed impossible to make definite determinations. Some, as no. 12026, and no. 12356, with their narrow leaves and reddish stems, resemble *L. angustifolia*, while others, as no. 12006 and no. 12009, are more like *L. punctata* var. *nebraskana*. Thus it seems possible that in this zone intergradations had occurred and had been successfully propagating.

Probable intermediates between *L. punctata* Hook. var. *nebraskana* and *L. angustifolia* Bush.—MISSOURI. Holt Co.: on the mounds, Watson, Sept. 3, 1920, *B. F. Bush*, 9185, 9185a (NY), Sept. 30, 1930, *Bush*, 12006, 12009 (NY); high mounds, Mound City, Oct. 14, 1930, *Bush*, 12026, 12035 (NY), Sept. 29, 1931, *Bush*, 12356 (NY). OKLAHOMA. Choctaw Co.: limestone prairies near Hugo, Oct. 6, 1923, *E. J. Palmer*, 24046 (G).

28. Liatris **bracteata,** sp. nov., herba pauci- vel multiramosa, laesa vel culta ramosior; caulibus glabris e cormo subgloboso ca. 4 cm. diametro; foliis linearibus glabris punctatis rigidis leviter canaliculatis, basalibus 7–12 cm. longis 2–3 mm. latis demum rigidis, superioribus ad bracteas subinde capitula superantes reductis; spica laxissima; capitulis paucis magnis plerumque 8–10-floris subturbinatis 2 cm. longis summo pappo 1.5 cm. latis inter se 1–3 cm. distantibus, vel saepe capitulo solo terminali 10–14-flore; phyllariis exterioribus ovato-acuminatis, interioribus late lanceolatis plerumque cuspidatis 10–12 mm. longis 3–4 mm. latis saepe purpurascentibus marginibusque longe ciliatis; corollis purpureis 9–11 mm. longis, tubo intus sparse piloso; pappo 10–15 mm. longo plumoso; achaeniis 8–12 mm. longis.—Known only from Texas.—Harris Co.: 15 mi. north of Houston, along Hwy. no. 290, Oct. 1936, *R. G. Reeves* (G, type). TEXAS. Without stated locality: 1857, *Leybold, ex Mus. Bot. Berol.* (US, 616780); *C. Wright* (G). Harris Co.: without stated locality, Sept. 1850[1], *G. Thurber* (G); ca. 14 mis. n. of Houston, along Hwy. no. 290, Aug. 29, 1936, *R. G. Reeves, L. O. Gaiser & P. Snure*, 48 (G); road from Cypress to Houston, Oct. 11, 1897, *F. W. Thurow*, 1 (US); Houston, 1842, *F. Lindheimer* (G); vicinity of Houston, Oct. 28, 1913, *J. N. Rose*, 18130 (US); Houston, Oct. 9, 1918, *G. L. Fisher*, 193 (US). Galveston Co.: without stated locality, Sept. 12, 1941, *Mrs. A. F. Nelson* (G). Matagorda Co.: north edge of town of Gulf, Oct. 10, 1934, *V. L. Cory*, 11566 (G); altitude 20′, Matagorda, Oct. 14, 1936, *G. L. Fisher*, 3682 (US).

Plants of the same population as the type had been seen and collected before the time of flowering, on Aug. 29, 1936, by the writer, along with Dr. R. G. Reeves who had seen it growing along Highway no. 290 for several years. Reports for November, 1943, are that the stand has been temporarily destroyed by fire but it is hoped that the sturdy underground rootstock may still have survived.

The species has seemingly been rarely collected. It is closely

[1] Plant. Nov. Thurb. Gray (1855) begins only with an account of collections made in Oct.–Nov. 1850, and we are therefore unable to give the exact locality for this specimen, dated Sept. 1850, but it is probably from between Houston and Austin.

matched by a specimen of V. L. Cory from the vicinity of Gulf, Matagorda Co., Texas (G), which he described under another name in an unpublished note seen at the Gray Herbarium, in which he called attention to the terminal heads. Because the heads are not merely terminal and axial ones do occur and develop, even though separated by long internodes, the name *bracteata* is here being used.

The species most closely resembles *L. mucronata* var. *interrupta* in having few heads distributed in a lax spike but is distinctive in having heads of more and larger flowers, longer achenes and pappus (which is also long-plumose) than are found in that species. Cytological evidence too has borne out the need of considering it a new species.

Summary of the Punctatae

It seems to the writer that plants of the *Punctatae* series, which undoubtedly spread westward and northward from some center, as Texas, had their origin in a species with a rounded corm, such as is common to most of the genus. *L. mucronata*, abundant throughout most of Texas, and represented in the Rio Grande plains and a little southward in Mexico by a variety showing a lax and elongated inflorescence, could have been such a species. However there also occurs quite abundantly in Texas *L. angustifolia*, having soft fine leaves and acuminate rather than mucronate bracts. An ancestral form of either species might have given rise to *L. punctata*.

Plants spreading westward, on reaching the extreme southwestern region of Texas and the interior of New Mexico, where the mountains make a foothold more difficult, seem to have developed elongate ramifying rootstocks. This characteristic, evident in *L. punctata* of the Trans-Pecos region, was apparently successful enough for the species to have followed along the mountains northward, even to the Canadian prairies. In harmony with the suggestion of such migration is the observation that, in going northward, one finds a change from the predominantly mucronate phyllaries in specimens from the southern mountains to generally lanceolate ones in specimens from Canada. Or the development of a branching and spreading rootstock might have come along with a direct northward extension

from the warmer central region of Texas of such an *angustifolia*-like form.

There are no sharp lines of demarcation between any two species except the marked characteristic of two types of rootstock. There is a general appearance common to the three species of broader and the two of more localized range which makes them, as a group, distinguishable from all other species, though it has often brought them all under the common name of *L. punctata*. *L. acidota*, when recognized, cannot be grouped with this alliance though it was wrongly associated with members of it, perhaps because some do show a rounded rootstock.

Series IX. Cylindraceae. Plants of intermediate height, 3–9 dm. tall, from loosely cymose, branched and bushy to single-stalked; heads few, 15–60-flowered, cylindrical to turbinate, approaching 2 cm. in height and 1–2 cm. in diameter; phyllaries herbaceous, appressed, obtuse to mucronate, sometimes spreading at the apices but never recurved; achenes 5–9 mm. long.—From southern Ontario westward to Minnesota and south to Missouri, with one species each in Florida and Texas.

a. Inflorescences cymosely branched; corolla-lobes non-pilose within....b.
  b. Heads compact, cylindrical; phyllaries closely imbricated, the inner ones mucronate.....29. *L. cymosa.*
  b. Heads loose, turbinate to hemispheric; phyllaries loosely imbricated, the inner ones obtuse.....30. *L. Ohlingerae.*
a. Inflorescence generally a short cymose raceme; corolla-lobes manifestly pilose within; heads compact, cylindrical; phyllaries closely appressed, obtuse to mucronate.....31. *L. cylindracea.*

29. Liatris cymosa (H. Ness) K. Sch. Corm rounded, up to 3 cm. in diameter: stems stiff, upright, 2.5–6 dm. tall, dichotomously cymosely branched above: leaves mostly glabrous, punctate, linear-lanceolate, the radical 15–20 cm. long and 5–15 mm. wide, tapering to a clasping petiole, the cauline linear, gradually reduced upwards: inflorescence finely pubescent and bearing heads in a distributed manner in either a simple or compound cyme; heads 2–2.5 cm. high and 7–10 mm. broad, of about 20 flowers; phyllaries appressed, closely imbricated, in about 6 series, slightly hirsute, ciliate-margined; the outer almost orbicular with rounded or truncate apices, the inner oblong with mucronate tips, often colored; flowers purple; corolla 15 mm. long, inner surface of lobes and tube smooth; pappus ca. 8–10 mm. long, plumose; achenes 8 mm. long, hispid on the ribs.—Just, Bot. Jahresb. xxvii. pt. i, 528 (1901). *Laciniaria cymosa* H. Ness, Bull. Torr. Bot. Club, xxvi. 21 (1899).

In Brazos and Washington counties, Texas.—Without locality, 1897, *A. M. Hildebrandt* (US). Brazos Co.: 1 mi. southeast of A. & M. College, Oct., 1896, *H. Ness* (NY, type); College Station, June, 1897, *R. H. Price*, 9 (US), 1935, *H. B. Parks*, 14538 (G), 14543 (T). Washington Co.: without locality, Aug. 15, 1938, *Miss E. Brackett* (G); *B. C. Tharp* (G).

Until seeing the two collections from Washington Co., Texas (G), which, as learned from Prof. B. C. Tharp, were collected twenty to thirty miles from the type-locality, I had known this species only from the one region where it was first discovered in 1896, by Dr. H. Ness, one mile south of the Agricultural and Mechanical College of Texas, growing on stiff clayey soil so poor that only a few species of grass dispute the ground with it. "Differing strikingly from other species in the scattered heads borne in a loose compound cyme", it nevertheless has heads of approximate size, flower-content and phyllaries that seem to relate it to *L. cylindricacea*. However, the inner surface of the corolla-lobes is glabrous rather than pilose as in that species. Thus we have again a parallel to the variation in the *Scariosae* series, where one species, *L. ligulistylis*, lacks the pilosity in the corolla-throat which other species of the series have.

30. Liatris Ohlingerae (Blake) B. L. Robinson. Root elongate, tuberous, somewhat segmented or lobed, fleshy, 2.5–4.5 cm. long, and about 0.7 cm. in diameter: stems 1–3, 6–9 dm. high, simple, stiff and puberulous: leaves numerous, narrow, linear, punctate, glabrous and sessile, the basal up to 5 cm. long and 2 mm. wide, gradually diminishing upwards: heads several, on slender bracteolate pedicels 1–5 cm. long, or more numerous (8–18) in a cymose panicle, 2.5–3 cm. high and, when flowers are open, hemispherical though containing only about 25 flowers; phyllaries long, erect, loosely appressed and not greatly overlapping laterally; the outer suborbicular to obovate, the inner up to 2.5 cm. long, lanceolate, obtuse-tipped, all herbaceous with narrow scarious or ciliolate usually purplish margins; phyllaries drop away almost completely leaving an exposed honeycombed receptacle; flowers ca. 1.5–2 cm. long; corolla purple, without pilosity, with long, spreading, almost rotate lobes; pappus a little shorter than the corolla-tube, ca. 13 mm. long and plumose; achenes 7–9 mm. long.—Contrib. Gray Herb. civ. 49 (1934). *Lacinaria Ohlingerae* Blake, Bull. Torr. Bot. Club 1. 203 t. 9 (1923). *Ammopursus Ohlingerae* Small, Bull. Torr. Bot. Club, li. 393 (1924).

In Polk and Highlands counties, Florida.—Polk Co.: in scrub

formation, 9 mi. southeast of Frostproof, Nov. 1, 1922, *Mrs. F. E. Ohlinger* (G, US, TYPE); in white-sand scrub, Lake Clinch, Frostproof, Sept. 23, 1934, (G, US), Sept., 1936 (US). *Ohlinger.* HIGHLANDS Co.: sandhills near De Soto City, Aug. 31, 1922, *J. K. Small, J. W. Small & J. B. DeWinkeler*, 10681 (G, F); dry pineland, Lake Stearns, Nov. 4, 1927, *O. F. Burger & E. West* (F); scrub, Avon Park, Sept. 4, 1934, *J. K. Small & E. West* (F); scrub, Sebring, Sept. 5, 1934, *Small & West* (F); palmetto scrub, 8 mi. southeast of Childs, Aug. 15, 1945, *L. O. Gaiser, Mrs. E. H. Butts & Miss L. Arnold* (F).

The rare *Liatris Ohlingerae*, known from but few stations in the adjoining counties of Polk and Highlands, Florida, was considered by Small to constitute a new genus, *Ammopursus.* It is indeed a very distinctive species by reason of its somewhat segmented and lobed root, its very large heads with loose phyllaries that overlap laterally very little and long flowers having an almost rotate corolla and also by an exposed somewhat honeycombed receptacle after the phyllaries have dropped away. However, because of the similarity of the achenes, pappus and punctate leaves, as well as general flower-characters, it is here considered a species of the genus *Liatris.* As it seems to approach *L. cymosa* more closely than *L. scariosa* in leaves, size and number of flowers per head, as well as in lack of pilosity in the corolla-tube, it is placed next to it in the *Cylindraceae* series. Like *L. cymosa*, it has so far been found only in a very limited region.

31. LIATRIS CYLINDRACEA Michx. Stems one to several, 3–6 dm. high, mostly glabrous though sometimes scantily hirsutulous, from a rounded corm up to 3 cm. in diameter: leaves linear, rigid, punctate, mostly glossy, glabrous, sometimes ciliate at base or along margin and rarely with the lower or both surfaces covered with short white hairs; radical leaves often 20 cm. long, 4–5 mm. wide, the cauline few and shorter along a lax inflorescence of usually 5–20 elongate heads of 30–60 flowers (sometimes only a single terminal head develops but undeveloped buds in lower axils appear in such plants); involucre herbaceous, appressed, making the large heads, 2–3 cm. long, and 1–1.5 cm. in diameter, appear ovoid, before anthesis; phyllaries mostly glossy, rigid, ovate and rounded at summit with abrupt mucronate to acuminate tips, the outer sometimes spreading in older heads but never recurved or squarrose; corolla purple or rarely white, 12–14 mm. long, with the inner surface of the spreading lobes distinctly hairy; achene 5–6 mm. long; pappus 1 cm. long and plumose.—Fl. Bor.-Amer. ii. 93 (1803); Ell. Sk. ii. 275 (1822?); DC. Prodr.

30 (1836); Torr. & Gray Fl. N. Am. ii. 69 (1841), excl. syn. Willd.; Gray Synop. Fl. i². 109–110 (1884). *L. intermedia* Lindl. Bot. Reg. t. 948 (1825). *Liatris stricta* Macnab, Edinb. New Phil. Jour. xix. 60 (1835). *Liatris flexuosa* Thomas, Amer. Jour. Sci. xxvii. 338 (1839). *Liatris squarrosa* δ *intermedia* DC., Torr. & Gray Fl. N. Am. ii. 68 (1841); Gray Synop. Fl. i². 109 (1884). *Liatris squarrosa* sensu Torr. in Am. Jour. Sci. iv. 66 (1827), non (L.) Willd. *Laciniaria squarrosa* var. *intermedia* Mac Millan, Metasp. Minn. Valley, 506 (1892). *Liatris marginata* Cass. Dict. Sci. Nat. xxvi. 236 (1823). *Liatris monocephala* Cass. ibid. 237. *Laciniaria nervata* Greene, Pittonia iv. 317 (1901). *Liatris cylindracea* var. *solitaria* MacM. Bot. Gaz. xv. 333 (1890). *Laciniaria cylindracea* f. *solitaria* MacM. Metasp. Minn. Valley, 506 (1892). *Laciniaria cylindracea* var. *solitaria* Farwell, Rep. Mich. Acad. Sci. xvii. 171 (1916).

From southern Ontario and western New York westward to Minnesota and Missouri.—ONTARIO. Manitoulin Co.: limy soil, La Cloche Peninsula, July 11, 1937, *A. S. Pease & R. C. Bean*, 26205 (G); thin soil on limestone, Cloche Bluff, McGregor Bay, July 25, 1915, *F. V. Coville* (US); limestone flats, Cloche Peninsula, Aug. 20, 1932, *N. C. Fassett*, 14885 (G); Strawberry Island, Aug. 9, 1892, *W. Herriot* (WH). Waterloo Co.: dry ground near Galt, Sept. 5, 1905, *J. E. Kerr* (G, WH). York Co.: High Park, Toronto, Aug. 5, 1901, *J. M. Macoun* (G, NY); east Toronto, Aug. 7, 1892, *C. W. Armstrong* (US); on vacant lot, Babys Point, Toronto, Aug. 14, 1942, *W. C. Mansell*, 6453 (HB); Humber plains, near Toronto, July 28, 1898, *W. Scott*, 22770 (Ot); sandy soil, High Park, Toronto, Aug. 26, 1938, *G. D. Darker* (G); High Park, Toronto, Aug. 24, 1927, Sept. 15, 1929, Aug. 9, 1930, *H. H. Brown* (HB). Peel Co.: sandy soil, Port Credit, Aug. 11, 1891, *J. White*, 965 (Ot). Brant Co.: moorland ground e. of Brantford, Aug. 11, 1834, *J. MacNab* (P, probably isotype of *Liatris stricta* MacNab). Norfolk Co.: moist sandy meadow, Long Point, L. Erie, Aug. 25, 1938, *H. A. Senn & J. H. Soper*, 552 (G, NY); Turkey Point, Sept. 4, 1927, *F. L. Davis* (NY); Silver Hill, Aug. 3, 1936, *H. H. Brown*, 5261 (HB). Middlesex Co.: dry sandy woods, London, July 29, 1879, *Burgess* (Ot); sandy woodland, London, July 29, 1879, Sept. 30, 1882, *T. Millman* (To). Lambton Co.: near Sarnia, *C. K. Dodge*, Aug. 22, 1892, 11586 (Ot), 1896 (To); Port Francis, Sauble R., Sept. 1, 1883, *Burgess* (Ot): sandy dunes along L. Huron near Port Franks, Sept. 2, 1929, *E. J. Palmer*, 36258 (G); Grand Bend, Aug. 22, 1932, *H. H. Brown* (HB). Kent Co.: dry soil in open woods, Rondeau Park, Aug. 14, 1934, *R. F. Cain*, 1246 (To). NEW YORK. Niagara Co.: whirlpool woods, July 1877, *D. F. Day* (NY); Niagara Falls, *G. W. Clinton* (NY); bluffs of Niagara R., Aug. 19, 1875, *Morong* (NY). Erie Co.:

Buffalo, *ex Herb. G. W. Clinton* (Q). MICHIGAN. CHEBOYGAN Co.: jack-pine plains, s. of Burt Lake, Aug. 22, 1920, *J. H. Ehlers*, 1263 (G), July 30, 1928, *F. C. Gates*, 15388 (US); s. of Indian R., Aug. 21, 1931, *H. A. Gleason* (NY). CRAWFORD Co.: vic. of Grayling, July 1922, *C. V. Piper* (G, US). IOSCO Co.: Oscoda, Aug. 23, 1906, *H. H. Rusby* (NY). ST. CLAIR Co.: Fort Gratiot (Port Huron), 1829, *Dr. Pitcher* (NY). WASHTENAW Co.: bank of Huron R., ½ mi. n. e. of Cedar Bend, Aug. 19, 1935, *F. J. Hermann*, 6989 (NY); open oak slope, Cedar Bend, 1 mi. n. e. of Ann Arbor, Aug. 5, 1937, *F. J. Hermann*, 9131 (G, US); dry bank, Ypsilanti, Sept. 16, 1917, *B. F. Chandler* (US). KALAMAZOO Co.: n. w. part of Texas Twsp., July 16, 1938, *C. R. Hanes*, 288 (NY). OHIO. FRANKLIN Co.: Georgesville, Aug. 29, 1892, *W. C. Werner* (NY). ADAMS Co.: Buzzard Rock, Sept. 11, 1937, *F. Bartley & L. L. Pontius*, 611 (NY). INDIANA. LA PORTE Co.: sandhills, s. shore of L. Michigan, Michigan City, Aug. 12, 1909, *G. L. Fisher*, 14 (US). PORTER Co.: Dune Park, Sept. 25, 1914, *F. W. Johnson*, 1567 (NY); open sandy woods, Portchester, Aug. 29, 1915, *F. W. Johnson*, 2122 (US). LAKE Co.: sandy knolls, Edgmoor, Aug. 31, 1889, *L. N. Johnson* (G); Whiting, Aug. 29, 1893, *N. L. Britton* (NY); Pine, Aug. 22, 1915, *F. W. Pennell* (NY); Gibson, *O. E. Lansing, Jr.*, 3914 (G). STARKE Co.: dry gravelly hillside, e. of Bass Lake, July 24, 1906, *C. C. Deam*, 1243 (NY). NEWTON Co.: prairie area along Pa. Rwy. & road 24, 1 mi. w. of Goodland, Aug. 14, 1943, *R. C. Friesner*, 17895 (G). CLARK Co.; dry sands, Clarke, Aug. 4, 1896, *L. M. Umbach* (US). WISCONSIN. Co. undetermined: sandy pine barrens around Thunder Lake, Aug. 1884, *D. H. Hasse* (NY). PRICE Co.: bluffs of Mississippi R., Aug. 9, 1926, *P. A. Rydberg*, 9671 (NY). TREMPEAULEAU Co.: Blair, 1889, *F. F. Wood* (US). ADAMS Co.: July, *I. R.* (US). JUNEAU Co.: Camp Douglas, *E. A. Mearns*, Aug. 22, 1890, 139 (US), July 16, 1890, 130 (G). COLUMBIA Co.: Dells of Wisconsin, *D. H. Hasse* (NY). SAUK Co.: pine sand barrens, Delton, Aug. 6, 1892, *R. H. True* (G); sandy bluffs of Wisconsin R., vic. of Kilbourn, Aug. 25–6, 1909 (no. 12), Aug. 28, 1909 (no. 56) *E. S. Steele* (US). MILWAUKEE Co.: Milwaukee, *I. A. Lapham* (G, NY). JEFFERSON Co.: Busseyville (F. Atkinson) 1872, *T. Kumlien* (Q). DANE Co.: s. of Madison, Aug. 30, 1893, *J. R. Churchill* (G). WALWORTH Co.: Delavan, Sept. 1887, *Mrs. J. M. Milligan* (US). ROCK Co.: Beloit, Sept. 1882, *L. H. Bailey, Jr.* (G); along the Chicago & N. W. Rwy., Clinton, Sept. 1, 1909, *E. S. Steele*, 101 (US). LAFAYETTE Co.: Fayette, Aug. 21, 1889, *L. S. Cheney* (G). ILLINOIS. Without stated locality: *Chapman* (NY), *Babcock* (G), Aug. 1872, *H. H. Babcock* (US), *Mead, ex Herb. H. P. Sartwell* (G), *Dr. Mead* (G), *Vasey*, 1873 (US), *Vasey* (G). Co. undetermined: prairies, Sept. 1837, *C. W. Short* (G, US).

Lake Co.: dry sandy ridges, along lake shore, Waukegan, 1906, *H. A. Gleason & F. D. Shobe*, 376 (G); Waukegan, Sept. 3, 1877, *R. E. Earle* (US). McHenry Co.: Cary, *H. C. Benke*, Nov. 18, 1932, 5615 (G, US), Aug. 11, 1928, 4803 (US). Winnebago Co.: prairies, Aug. 1859, *M. S. Bebb* (G); Fountaindale, *M. S. Bebb* (NY, US). Stephenson Co.: hilltops, along cliffs, Freeport, Sept. 1, 1901, *C. F. Johnson* (US). Cook Co.: Riverside, Aug. 1911, *J. M. Greenman* (G); Chicago, *H. H. Babcock* (G, NY, US), Nov. 1887, *ex Herb. W. Boott* (G). Du Page Co.: Banks, Aug. 11, 1891, *W. S. Moffatt*, 350 (US); Pine Hills, Aug. 16, 1878, *F. S. Earle* (ND). Kane Co.: Aurora, Sept. 1884, *T. E. Boyce*, 1172 (G). Henry Co.: Galva, 1883, *Mrs. C. N. S. Horner* (G). Peoria Co.: dry prairies, Peoria, *F. E. Macdonald*, Sept. 1903 (G), Aug. 1903 (NY). Henderson Co.: prairies near Oquawka, Sept. 1875 & 1880, *H. N. Patterson* (NY); rocky hillsides, near Oquawka, 1883 (no. 15), Sept. & Oct. (no. 533), Sept. 1887 (no. 534) *H. N. Patterson* (US); Oquawka, Sept. 1876, *H. N. Patterson* (ND, Q). Champaign Co.: dry ground, Champaign, Aug. 2, 1899, *H. A. Gleason*, 886 (G); cutting on I. C. R. R. Sept. 11, 1909, *A. S. Pease*, 12402 (G). Cass Co.: dry prairies, Beardstown, Aug. 1842, *C. A. Geyer* (G, NY). Madison Co.: meadows e. of St. Louis, Aug. 1836, *Diehl* (NY). MINNESOTA. Pope Co.: Glenwood, Aug. 1891, *B. C. Taylor* (NY, US). Hennepin Co.: Fort Snelling, Aug. 7, 1909, *C. O. Rosendahl*, 2346 (G); copses, Aug. 1889, *J. H. Sandberg* (US). Kandiyohi Co.: Spicer, Aug. 1892, *W. D. Frost* (US). Wabasha Co.: Lake City, Aug. 1883 (NY), Sept. 1883 (G), *W. H. Manning*. Goodhue Co.: Featherstone, Aug. 1893, *A. P. Anderson* (G, US); Zumbrota, Aug. 1892, *C. A. Ballard* (US). Winona Co.: dry open bluffs, Sept. 1905, *J. M. Holzinger* (NY); Winona, Sept. 1889, *J. M. Holzinger* (US). Nobles Co.: dry hills, Adrian, Aug. 29, 1895, *Miss J. B. Patten* (G). IOWA. Co. undetermined: prairies, Aug. 1815, *W. W. Denslow* (NY). Fayette Co.: dry prairies, Aug. 1894, *B. Fink* (G), Aug. 3, 1894, *B. Fink*, 328 (US), Aug. 26, 1897, *J. R. Garraner*, 727 (NY). Dubuque Co.: prairies, Dubuque, Aug. *A. Morr* (G). Hardin Co.: vicinity of Iowa Falls, Aug. 1928, *M. E. Peck*, 132 (G). MISSOURI. St. Louis Co.: Meramec Highlands, Aug. 22, 1917, *J. M. Greenman*, 3833 (G, NY); St. Louis, *Drummond* (G); St. Louis prairies, July 1833, *Engelmann* (G); rocky hills, St. Louis, Aug. 30, 1875, *H. Eggert*, 143 (US); St. Louis, Aug. 30, 1875, *H. Eggert* (G, NY, US); Allenton, Aug. 25, 1883, *G. W. Letterman* (NY, US). Shannon Co.: dry rocky woods, near Montier, Oct. 5, 1920, *E. J. Palmer*, 19295 (G); rocky woods, Montier, *B. F. Bush*, Oct. 8, 1905, 3596 (G, US), Sept. 10, 1908, 5127 (G, US), Aug. 5, 1910, 6109 (US); common in woods, Montier, Aug. 2, 1899, *B. F. Bush*, 221 (NY, ND, type of *Laciniaria nervata* Greene);

rocky woods, Montier, Aug. 4, 1927, *B. F. Bush*, 11421 (US). WRIGHT Co.: 2 mis. s. e. of Cedar Gap, July 28, 1937, *J. A. Steyermark*, 23737 (NY). GREENE Co.: dry ground, Sept. 4, 1893, *B. F. Bush*, 197 (G); thin woods, vicinity of Strafford, Aug. 27, 1912, *P. C. Standley*, 9497 (US). OZARK Co.: rocky glades above river bluffs, near Tecumseh, Oct. 8, 1927, *E. J. Palmer*, 32958 (G); Tecumseh, Oct. 9, 1927, *E. J. Palmer*, 33036 (NY). ARKANSAS. BAXTER Co.: limestone ridges, hillsides, Cotter, Oct. 28, 1913, *E. J. Palmer*, 4770 (US); dry rocky woods, Cotter, Aug. 31, 1915, *E. J. Palmer*, 8398 (US).

Liatris cylindracea was described by Michaux, from the meadows of Illinois as "tota hirsutula". Elliott (Sk. ii. 275–6 (1822?)) though including this species in his list of plants for South Carolina and Georgia "on the somewhat questionable authority of Pursh . . . questionable as regards the habitat of his species", described a glabrous plant which he had received from Dr. Torrey and which had been collected on the shores of Lake Michigan. He pointed out that: "although by a many flowered involucrum, and the want of pubescence, it varies from the description of Michaux, it yet resembles his plant in too many respects to be easily separated from it". By 1841, Torrey and Gray (Fl. ii. 69), having seen more specimens, described it as: "glabrous or slightly hairy", and reported it from Missouri to Upper Canada and Michigan.

Specimens at present available from various herbaria indicate that this species is to be found mostly in the states lying along the upper part of the Mississippi River: on the west side in those approximately north of the Missouri-Arkansas state-line, and on the east side in those north of the Ohio River, including Indiana, Michigan and the southern peninsula of Ontario, and in Niagara County of New York. The specimens from Manitoulin Island in Georgian Bay, which is north of its general range in Ontario, suggest that the species had come there by way of the narrow straits from northern Michigan since it is found in Cheboygan County. It appears northward from about where *L. squarrosa* leaves off. Where the range of the two overlap, as in Missouri and southern Illinois, specimens are more frequently hirsute than in Ontario where they are generally glabrous, and this would explain Michaux's descriptive term "hirsutula", since he did not travel farther west or north than southern Illinois (see no. 6). It is also probable that intermediate forms showing a blending of

the hirsute character of *L. squarrosa* and the nonrecurved bracts of *cylindracea* occur. The two species have a common character in the pilosity on the inside of the corolla-lobes which was first noted by Nuttall, under his description of *L. squarrosa* (Gen. ii. 132 (1818)). Intermediates between the two varieties *glabrata* and *hirsuta* of *L. squarrosa* have been mistaken for *L. cylindracea* but such specimens can be recognized by the recurved bracts.

Throughout the range of *L. cylindracea* there is a diversity in the outer phyllaries, which may be less mucronate-tipped, appearing acute and more elongate. This additional varying character may have been responsible for the description by Lindley of a new species, *Liatris intermedia*, grown from roots collected in Ontario by Mr. Goldie (see discussion under no. 32), since Michaux's description of *L. cylindracea* as being "tota hirsutula" and few-flowered would indicate a different plant. From the plate, showing cylindrical buds with appressed phyllaries, there seems little doubt that *L. intermedia* is correctly placed, with numerous other Ontario collections, under *L. cylindracea*. The fact that MacNab (Edin. Phil. Jour. xix. 60 (1835)) also described under the new name *L. stricta* a plant collected in Ontario from the roadsides for several miles through the pine barrens east of Brantford, Aug., 1834 (an isotype, if not the type, was seen at Philadelphia), and that again, Thomas (Amer. Jour. Sci. xxxvii. 338 (1839)) gave a new name, *L. flexuosa*, to a specimen from the east bank of the Niagara River, seems to indicate that Michaux's phrase had limited extremely the application of his description by other authors. By comparison with a photograph of Michaux's type, seen at the Gray Herbarium, the descriptions and figures of all of these Ontario plants fit into the concept of his species as seen more frequently at the northern end of its range.

Being a species of shorter inflorescence with fewer large heads (as is *L. squarrosa* in the *Squarrosae* series and *L. ligulistylis* in the *Scariosae* series), specimens are frequently found having but one well developed terminal head. In the axils of the upper leaves of such plants, however, one or more small aborted buds are often discovered, evidence perhaps of some unsatisfactory conditions for full development of the plant and a consequent reduction in the number of heads developing, for the corm in some such specimens has been found to be partly rotted, as in

H. C. Benke, no. 5616, from Cary, McHenry Co., Ill., Nov. 18, 1932 (G, US). Also in a plant of several stems a single stem might be one-headed. Thus it seems hardly necessary to recognize the plant with a single terminal head as a variety, as did Farwell in *Lacinaria cylindracea* var. *solitaria* (Rep. Mich. Acad. Sci. xvii. 171 (1916)), or even as a form, as did MacMillan in *Laciniaria cylindracea* forma *solitaria* (Metasp. Minn. Valley 506 (1892)).

Though no report in the literature has been found of white-flowered plants of this species, one large plant was found, Aug. 21, 1940, by the writer, no. 213, at Turkey Point, Oxford Co., Ont. (G), adding one more species to the list in which albinos exist. As was frequently experienced after transplantation, the albino died at the end of the next flowering season, though other individuals persisted several years longer.

× Liatris Gladewitzii (Farwell) Shinners (*L. aspera* or *sphaeroidea* × *cylindracea*). Corm irregular or globose, 3–4 cm. in diameter: stems to a dozen, 4–9 dm. high, glabrous and striate below and pubescent above: leaves linear-lanceolate, punctate, glabrous to but scantily pubescent beneath, the lower up to 25 cm. long and 0.7–1.4 cm. wide, the upper reduced, narrowly linear and acute: inflorescence an open raceme, 10–30 cm. long, of ca. 6–9 heads 1–4 cm. distant: heads 20–30-flowered, on short pedicels 0.5–1 cm. long, cylindrical to slightly turbinate, 1.8 cm. long and 1–1.2 cm. wide; phyllaries glabrous, punctate, obtuse and quite closely appressed, herbaceous with a scarious purplish margin, the outer ca. 0.3 cm. in diameter, almost orbicular or ovate, erose on the margin, the middle and inner oblong, 1–1.3 cm. long and 0.5 cm. wide with more colorful and more erose margins but not becoming crisped; corolla purple, 1–1.3 cm. long, with the lobes conspicuously hairy and the tube pilose within; pappus 9–10 mm. long, short-plumose, thus rather intermediate between barbellate and plumose; achene 6–7 mm. long and blackish.—Amer. Mid. Nat. xxix. 37 (1943) (*L. cylindracea* × *sphaeroidea*). *Lacinaria Gladewitzii* Farwell, Amer. Mid. Nat. x. 43 (1926) (*Lacinaria cylindracea* × *scariosa* var. *sphaeroidea*).

Reported only from southern Ontario, Michigan and Wisconsin.—ONTARIO. Kent Co.: sandy ground, Rondeau, Sept. 5, 1931, *N. C. Fassett*, 15026 (W). Lambton Co.: sandy ground, pine-oak scrub, ca. 5 mi. south of Grand Bend, Sept. 6, 1942, *L. O. & W. H. Gaiser*, 243 (G). MICHIGAN. Oakland Co.: dry hills, Rochester, July 26, 1926, *O. A. Farwell*, 7584 (Herb. Cranbrook Inst., type). WISCONSIN. Crawford Co.: dry

summit of limestone bluff, Prairie du Chien, Aug. 20, 1927, *N. C. Fassett*, 4478 (W).

Farwell found his type of *Lacinaria Gladewitzii* growing in association with what he called "*L. scariosa* and its variety *sphaeroidea* and *L. cylindracea*" and he stated it was an "exact intermediate between the last two".

Though neither the type specimen of *L. Gladewitzii* nor any material of what Farwell called *Lacinaria scariosa* var. *sphaeroidea* are available for examination at this time, two other collections by Dr. N. C. Fassett, referred to *Liatris Gladewitzii* by Shinners have been seen. One of these, from sandy ground at Rondeau Park, on Lake Erie in Southern Ontario (W), was reported to be growing with *L. sphaeroidea* and the other came from limestone bluffs, in Crawford Co., Wisc. (W). Also the writer has found one plant growing with a population of *L. cylindracea* south of Grand Bend, on the south-east shore of Lake Huron, where along the sandy stretch of pine-oak woods are also to be found *L. aspera* Michx. and × *L. sphaeroidea* Michx.

These different collections seem to bring confirmation to the occurrence of this hybrid. The specimens resemble *L. cylindracea* in the narrow, rigid, almost glabrous leaves, the open raceme-like inflorescence of comparatively few short-pedicelled heads, the appressed phyllaries and especially the conspicuous hairs on the inside of the corolla-lobes. In the characters of the stem, pubescent above, and the phyllaries, narrowly scarious and a little colorful but not at all bullate, and the pilose corolla-tube, they bear resemblances to *L. aspera* or × *L. sphaeroidea.* The latter, as here interpreted and abounding around the Great Lakes, has become a very stabilized hybrid showing less crisped phyllaries and thus less globular and more campanulate heads than *L. aspera* (see no. 18).

(*To be continued*)

THE PRESUMABLE IDENTITY OF CHEILANTHES LANOSA

M. L. Fernald

In 1803 Michaux, Fl. Bor.-Am. ii. 270 (1803), described from the mountains of Tennessee and North Carolina his *Nephrodium lanosum:*

> LANOSUM. N. parvulum; elegans; totum lanosissimum: fronde oblonga, bipinnatifida; pinnis distantibus; pinnulis pinnatifidis; lobulis subrotundo-ovalibus, integris: punctis demum contiguis.
> *Obs.* Habitus quodammodo Polyp. *fontani;* paulo majus.
> *Hab.* in montibus saxosis Tennassée et Carolinae septentrionalis.

Certainly Michaux's "totum lanosissimum" and his description of the frond and especially its pinnules are promptly matched by the extremely lanate fern of the mountains of North Carolina and Tennessee which was described thirty years later as *Cheilanthes tomentosa* Link, Hort. Berol. ii. 42 (1833), . . . "stipes tomentosus . . . , pinnae . . *infra dense tomentosae*", which in his full description D. C. Eaton, Ferns N. Am. i. 346, 347, rendered, "stalks . . . covered with . . . soft woolly hairs . . . The fronds . . . of a grayish color from the abundance of fine entangled tomentum." Are not these descriptions very close to Michaux's "totum lanosissimum"?

Michaux saw in his *Nephrodium lanosum* the habit of *Polypodium fontanum* of Europe, i. e. *Asplenium fontanum* (L.) Bernh., but the new American species was "a little larger". Hegi describes *Asplenium fontanum* as "Bis 25 cm hoch", *i. e.* 10 inches. Eaton, l. c., says of *C. tomentosa:* "The fronds vary from a few inches to over a foot in length".

On the mountains of North Carolina and Tennessee there is another species of *Cheilanthes,* which was described only one year after *Nephrodium lanosum* of Michaux. This is *Adiantum vestitum* of Sprengel, Anleitung, iii. 122 (1804).

> *Adiantum vestitum* nenne ich eine Art, die Bosc d'Antic in Karolina fand. Sie hat einen dreyfach gefiederten Wedel, der über und über mit feinen woltichten Haaren bedeckt ist. Die Blättchen

der ersten und zweyten Ordnung sind ey-lanzetförmig; die der letzten Ordnung sind linienförmig, gekerbt und schlagen sich um die Saamenhäufchen zurück. B o s c nannte dies Farrenkraut Acrostichum hispidum.

Adiantum vestitum Spreng. (1804) from Carolina soon became *Cheilanthes vestita* (Spreng.) Swartz, Syn. Fil. 128 (1806) and under this name it was generally recognized in practically all works up to and through the 6th edition of Gray's Manual (1890), the *Pteridophyta* by D. C. Eaton, there (p. 681) properly described as "hirsute" and with the same characteristic illustration (pl. xvii) as had appeared in earlier editions, although these treatments may have had other species mixed with *C. vestita*. That *Cheilanthes vestita* and *C. tomentosa* are wholly distinct species no one questions; but that *C. vestita* is at all the plant clearly described as *Nephrodium lanosum* Michx., "totum lanosissimum", I can not believe. Neither did the earliest students of the group, who had the Michaux material before them. Thus, in 1804, Poiret, writing at Paris with Michaux's herbarium at hand, gave a more detailed account of the Michaux plant in Lamarck's Encyclopédie, v. 538 (1804), as *Polypodium lanosum*, although Poiret, with true French courtesy, ascribed *P. lanosum* to Michaux, a natural enough treatment since at the beginning of his long treatment of *Nephrodium* Michaux had entered "Polypodium. L.". It is not necessary here to repeat Poiret's transcription of the text of Michaux (already quoted); Poiret's own additions, based obviously on the material before him, were as follows:

105. Polypode laineux. *Polypodium lanosum*. Michaux.

Polypodium pumilum, lanuginosum, fronde bipinnatâ; foliolis oblongis; pinnulis linearibus, lobatis, obtusis; stipite subcylindrico, ruffo. (N.)

. . . . . .

C'est une plant peu élevée, d'un port agréable, lanugineuse sur toutes ses parties, dont les pétioles sont droits, roides, d'un brun foncé, cylindrique; un peu comprimés, garnis de folioles alternes, distantes les unes des autres, munies de pinnules opposées, presque pinnatifides, fort petites, linéaires, divisées en lobes ovales, arrondis, très-entiers. La fructification consiste en petits points épars, très-rapprochés.

> Cette plante croît sur les rochers pierreux de la Caroline & dans quelques autres endroits de l'Amérique septentrionale. (*V. s. Comm.* Bosc.) Elle a beaucoup de rapports avec le *polypodium fragrans*, Desfont.

It can hardly be affirmed that Poiret was describing something different and imagining characters not stated by Michaux, especially when the Michaux Herbarium was at his elbow. The facts that Swartz, Syn. Fil. 58 (1806), in transferring *Nephrodium lanosum* to *Aspidium* as *A. lanosum*, said "fronde tota lanosissima", while, on p. 128, in changing *Adiantum vestitum* Spreng. to *Cheilanthes vestita*, he said "frond . . . hispidulis", were corroborative, although they were somewhat literal transcripts of the original diagnoses. But, after many experiences with Michaux's species, my faith in the accuracy of André Michaux, his editor, L. C. Richard, and Poiret, who more fully described many of Michaux's plants, is so great that I place far more weight upon their descriptions than upon the confusions apparently made in the probably subsequent placing of loose labels upon the much-handled old specimens by a presumably non-botanical mounter.

A sheet in Michaux's Herbarium at Paris (a beautiful photograph taken by Mrs. Weatherby before me) containes 6 broken-off fronds which very clearly belong to *Cheilanthes vestita*, the plant with hispid or hirsute (not tomentose or lanate) fronds. This sheet has pasted on (presumably at a later date) the label of "HERB. MUS. PARIS" bearing at the bottom "Herbier de l'Amérique septentrionale d'ANDRÉ MICHAUX", and below that the label in the handwriting of André Michaux of *Polypodium lanosum*, with the "Hab. in excelsis montibus saxosis Tennessee et Carolina septentrionalis 2l." The label is that of *Nephrodium lanosum*, Michaux having removed his genus *Nephrodium* from the inclusive *Polypodium* of Linnaeus subsequent to writing the label; but the sheet of 6 specimens to which it became attached is not at all of plants "totum lanosissimum". Whether in the Michaux Herbarium or in those of Lamarck or of Poiret there is a Michaux sheet with very lanate fronds is an academic question which may sometime be settled. Certainly the sheet of specimens with the labels does not contain the plants which Michaux (or L. C. Richard) and, afterward, Poiret described.

Such mixtures of labels, added to sheets which had apparently earlier been mounted, are occasional through the Michaux and other old Herbaria. In my own work with other groups I have sometimes noted them.[1] Since the sheet which now bears Michaux's label "*Polypodium lanosum*", etc. has 6 fronds, it is significant that when D. C. Eaton studied Michaux's material in 1866, he stated that there were "five medium-sized fronds" (D. C. Eaton in Canadian Naturalist, v. 26 (1870)). It is evident that Michaux's Herbarium has had more than a single sheet which has passed as *Nephrodium lanosum*. I can not subscribe to the argument that, when Michaux and then Poiret described a plant as "totum lanosissimum" they really meant one which is merely hispid and not at all lanate.

The first few species described from eastern North America of what is now the genus *Cheilanthes* were hopelessly misunderstood. These confusions were specially concentrated in the late 50's of the last century. Thus, in his Species Filicum, ii. 98 and 99 (1852), Hooker described as "Cheilanthes '*vestita*, Sw.'?" (the interrogation indicating his doubt) and illustrated (his t. CVIII. B) a fern with "stipites . . . as well as the main rachis . . . laxly woolly, fronds . . . at the margins beneath and on the partial rachis, densely woolly the wool more or less tawny". As synonyms he gave (1) *Cheilanthes lanuginosa* Nutt. (an herbarium-name which was later, through Nuttall's material, identified with the western *C. Feei* Moore, based on *Myriopteris gracilis* Fée, not *Cheilanthes gracilis* Kaulf. (1824); (2) *Nephrodium lanosum* Michx. (1803), with the derived binomial *Aspidium lanosum* Sw., just as he had included the original *Adiantum vestitum* "'*Spreng. Anleit.* iii. *p.* 122'". The latter reference was quoted and the identity of the "densely woolly" "*Cheilanthes vestita*" was doubted by Hooker because he had not seen and seems rather to have doubted Swartz's correct description and Schkuhr's accurate illustration of it. Hooker said (p. 99): "What we here describe and figure as *Cheilanthes vestita* is . . . no doubt the *Nephrodium lanosum* of Michaux, Fl. Bor. Am. (1803), and he properly describes the fronds as 'lanosissimae'. Swartz, however, who adopts Sprengel's (prior?) specific name,

[1] For example see plate 1045 in Rhodora, xlviii. (1946) with the label over, instead of beneath the base of the leaf.

vestita, given in a work to which I have no immediate access, describes the fronds as *hispidulous*. Schkuhr adopts the same term, and figures a plant, the under side of which gives no idea of the really woolly nature of the frond; having, moreover, entire oblong pinnules, with a solitary terminal involucre". Michaux was correct in describing one plant, the lanate *C. lanosa* (Michx.) D. C. Eaton; Sprengel and Schkuhr were as vividly (even to the involucre as shown by Schkuhr) correct in describing another species, *C. vestita* (Spreng.) Swartz!

It is needless for one who is not a pteridologist and who is helpless in trying to understand all those who are, to follow all the subsequent confusions, but at least one other must be noted. This was D. C. Eaton's abbreviated and rather confused paragraph, without a word of description, in Torrey's Botany of the Mexican Boundary, 234 (1859), where the combination *Cheilanthes lanosa* was based on a doubted basonym, with at least two other synonyms involved, thus giving us the now supposedly sacrosanct combination which has been in vogue for half a century, *C. lanosa*, for a plant which is not lanate! Here is Eaton's paragraph:

> Cheilanthes lanosa. C. vestita, *Hook. l. c. p.* 98, *t.* 108, B. Nephrodium lanosum, *Michx. Fl. Bor.-Am.* 2, *p.* 270? Myriopteris gracilis, *Fée, l. c. p.* 150, *t.* 29, *f.* 6. Along the Rio Grande; *Wright.* The name of C. vestita unquestionably belongs to the fern described and figured by Professor Gray under that name in the *Manual*, (2*d. ed.*) *p.* 592, *t.* 10.

Embarrassingly enough, the last item is the only one that was well founded. Eaton, although making the transfer, doubted the identity with the others of the Michaux plant; *Myriopteris gracilis* is by all students now considered a separate species, *Cheilanthes Feei* Moore, while the plant of *Charles Wright*, which inspired the paragraph, was later identified by Eaton, in his Ferns of N. Am. i. 41 (1878) as *C. lanuginosa* Nutt. (originally a synonym only of Hooker's confused *C. vestita*, but validated in 1863 by D. C. Eaton, although this was later than *C. Feei* Moore (1857) which, I am told, is the same species).

In his Ferns of N. Am. l. c. 13–15, Eaton got identities more straightened out, for he correctly took up the name *Cheilanthes vestita* for the plant with "fronds . . . hirsute . . . ; . . . the

ends of the roundish or oblong lobes reflexed, and forming separate herbaceous involucres". But he still kept in its synonymy the perpetually misinterpreted *Nephrodium lanosum* Michx. ("totum lanosissimum") with the first unequivocal name for it under *Cheilanthes*, "*Cheilanthes lanosa*, D. A. WATT, in Journal of Botany, February, 1874, p. 48: not of Moore, Index Fil., p. 245, nor of Eaton, Mex. Boundary Botany, p. 234, which synonyms belong to *Ch. lanuginosa*, Nuttall". On page 15, arguing for the retention of "well known" names, he said "Michaux's name, *Nephrodium lanosum*, is undoubtedly the first published of the various names for this fern [*C. vestita*, with the characters as originally given by Sprengel and by Swartz] . . . Usually it is well to keep the oldest specific name when it is known; but . . . to endeavor to replace well-known specific names by older, but obscurer ones, is surely reprehensible".

I have been told that it is "reprehensible" to displace the name *Cheilanthes tomentosa* Link (1833) by *C. lanosa* (Michx.) D. C. Eaton (1859), based on *Nephrodium lanosum* Michx. (1803), for the former name is "established", while the name *C. lanosa* has (erroneously) "become established" for *C. vestita* which is not lanose! I can hardly subscribe to this philosophy, even though Michaux's label got affixed, probably after his death, to a sheet of specimens which lacks the characters given by him, and in more detail by Poiret, from the original and perhaps now lost lanate specimens. For quite as long a period, through the 6th edition of Gray's Manual, the name *C. vestita* was correctly used for the hirtellous species. When it was "reprehensibly" displaced, through error, by the name *C. lanosa* established usage of that period was certainly (and unjustifiably) upset. It seems to me that the name CHEILANTHES LANOSA (Michx.) D. C. Eaton (1859), based nomenclaturally on *Nephrodium lanosum* Michx. (1803), should replace *C. tomentosa* Link (1833), if the original descriptions mean anything.

SOME TRIVIAL AMERICAN FORMS OF THE LADY-FERN

M. L. Fernald

Most of the so-called "varieties" of *Athyrium Filix-femina* (including *A. angustum* (Willd.) Presl and *A. asplenioides* (Michx.) Desv.) have already been properly transferred to formal rank but the few which follow seem to require such transfer. My apology for so treating them will be found in the discussion below.

Athyrium Filix-femina (L.) Roth, var. Michauxii (Spreng.) Farwell, forma **laurentianum** (Butters), stat. nov. *A. angustum* (Willd.) Presl, var. *laurentianum* Butters in Rhodora, xix. 194 (1917).

A. Filix-femina, var. Michauxii, forma **confertum** (Butters), comb. nov. *A. angustum*, forma *confertum* Butters, l. c. 195 (1917). *A. angustum*, var. *confertum* (Butters) C. S. & W. F. Lewis in Am. Fern. Journ. xi. 83 (1921).

A. Filix-femina, var. Michauxii, forma **laciniatum** (Butters), comb. nov. *A. angustum*, forma *laciniatum* Butters, l. c. (1917).

A. Filix-femina, var. asplenioides (Michx.) Farwell, forma **subtripinnatum** (Butters), comb. nov. *A. asplenioides* (Michx.) Desv., forma *subtripinnatum* Butters, l. c. 190 (1917).

For once I fully agree with the late O. A. Farwell, who reduced *Athyrium angustum* and *A. asplenioides* to varietal rank under *A. Filix-femina*. It seems to me quite impossible to keep apart on any stable morphological characters the circumboreal *Athyrium Filix-femina* and its two commoner eastern American representatives, *A. angustum* and *A. asplenioides*. Attempts to keep apart the two latter in the area where their ranges overlap are futile, this difficulty already noted by Weatherby in Am. Fern. Journ. xxvi. 134 (1936), where, considerately maintaining the three species recognized by Butters (*A. Filix-femina, angustum* and *asplenioides*), he wrote as follows:

> But his three species are very closely related, often much alike in general aspect and not always easy to distinguish. The two of eastern North America [i. e. *A. angustum* and *A. asplenioides*, for *A. Filix-femina*, either typical or as var. *sitchense* Rupr. grows on the Gaspé Peninsula and in Newfoundland as well as elsewhere in the East] are comparatively readily recognizable in the north and in the south where each is the exclusive occupant of its area; but in the region from southern New England to about the Potomac valley, where both

occur, they intergrade freely and in most perplexing fashion. All three would perhaps be better treated as geographic varieties of a single species, roughly analogous to those of *Cystopteris fragilis*.

In this connection it is significant that the indusia shown by Butters, l. c., in his plate 123 and in his figs. 3C and 5A and B, for *Athyrium Filix-femina* are rather extreme. The figures of European indusia given by Schkuhr in his Kryptogamische Gewächse, t. 58, by Hooker fil. in his British Ferns, t. 35, by Britten in his European Ferns (colored plate opp. p. 131) and by many others are reminiscent of indusia of *A. angustum*. Furthermore, when he made his study of the group, or later, in checking identifications in 1932, Butters clearly wrote on a few sheets from eastern Canada and Maine such notes as "This appears to be true European *A. Filix-femina*—F. K. B.", such embarrassing specimens coming from the Mingan Islands and Lake St. John, Quebec, and from Mt. Desert Island, Maine. The Mingan sheet (*Victorin & Rolland*, no. 24,616) had been distributed as *A. angustum*, var. *laurentianum*. The latter anomalous plant in its compact and often strongly ascending rhizome and its very short lower pinnae is superficially so close an imitation of small European plants that it is most difficult to view it as belonging to a separate species. In fact, when real pteridologists (to which highly specialized brotherhood I hardly belong) got hold of this form they wrote (Weatherby & Adams, List Vasc. Pl. Grand Manan—Contrib. Gray Herb. no. clviii. 21 (1945)) under *Athyrium angustum:* "Most of the specimens seen belong to the form distinguished as var. LAURENTIANUM Butters. Here they tend to be rather strongly cespitose, the stipes short and the blades conspicuously narrowed toward the base, thus approximating in appearance true *A. Filix-femina* of Europe." I fully concur, and only on very plastic characters can such plants be kept apart from European material. In 1932 Butters evidently thought so.

In Europe many scores of trivial forms have been treated as "varieties", but in Hedwigia, xlv. 119–123 (1906), Goldschmidt treated them as subvarieties and forms. This sane course is approved by Bergdolt in Hegi, Ill. Fl. Mitteleur. i. 48, he saying "Alle diese Varietäten werden noch in zahlreiche Subvarietäten und Formen aufgeteilt". In view of the great diversity of forms

assumed by the Lady-fern, the suggestion of the late James Britten (a crusty bachelor) that, in transferring the name *Filix-femina* from the bracken to the present species, Linnaeus perhaps had in mind the French proverb "Souvent femme varie", etc., is pertinent (or impertinent)!

Centaurea maculosa in Indiana.—According to Deam in his "Flora of Indiana", A. A. Hansen reported this species as a weed near Atlanta in Hamilton Co., near the center of the state (Proc. Ind. Acad. Sci. **36:** 251. 1927). Deam, although listing the plant in his "excluded species", states that it may become established soon if it has not already done so. Later, E. E. Sherff (Rhodora **48:** 98. 1946) takes note of Deam's remarks, and states that this species seems thoroughly established in adjacent southern Michigan.

September 22, 1941 I found a solitary plant on Route 20 in Porter Co., approximately 20 miles from the Michigan boundary. In a subsequent year I found another single plant on the same road, same county, about a mile west from the first. This region I looked over thoroughly in 1946, but no plants were found. August 27, 1946 I found several plants in the locality where the first was seen, apparently well established and able to compete successfully with any roadside weeds.

Specimens have been sent to the Gray Herbarium.—Edwin D. Hull, Gary, Indiana.

Setaria Faberii in North Carolina.—In the interest of tracing the rather rapid spread of the Asiatic grass, *Setaria Faberii* Herrm., in North America, it may be worth while to record this species for the first time in North Carolina. On August 5, 1946, while driving northwestward across the piedmont of North Carolina, I happened to glimpse the characteristic panicles of *S. Faberii* along Route 54 at Cane Creek in Orange County. Stopping to collect material, I found many scattered plants of the grass in a weedy roadside field with abundant *Lespedeza stipulacea*, the latter presumably planted intentionally and the former possibly introduced at that time.

Dr. H. L. Blomquist, to whom I sent material of this collection, upon examination of the specimens recalled collecting a robust *Setaria*, the arching panicles of which had attracted his attention, along U. S. Route 70 at Cherry Point in Craven County on August 23, 1945. Since at that time he was busy with other matters, the specimens had been stored away for future study. Examination proves this material also to represent *S. Faberii*.

At least these two collections, 150 miles apart, represent the grass in North Carolina. Whether or not it is permanently established in the state remains to be seen. Dr. Blomquist writes me that he did not see the species at Cherry Point in the summer of 1946. However, if it behaves in North Carolina in the same way as it has in western Virginia and in southeastern Pennsylvania and adjacent New Jersey it will soon become a well-established weed in recently disturbed soils. As H. A. Allard pointed out in reporting the grass from northern Virginia,[1] it does not seem to be able to compete with other species in ground which is not repeatedly disturbed, becoming then dwarf or disappearing altogether. In favorable places, however, as in rich bottomland corn fields, the plants may often reach a height of more than six feet.

The Craven County collection, *Blomquist 13722*, and that from Orange County, *Wood 6532*, are represented at the Gray Herbarium, the U. S. National Herbarium, the University of Pennsylvania and Duke University.—CARROLL E. WOOD, JR., Gray Herbarium.

[1] Va. Journ. of Science 2: 119. 1941.

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THE GENUS LIATRIS

L. O. Gaiser

(*Continued from page 383*)

Series X. Squarrosae. Plants of intermediate height, 3–6 dm. tall, with from few racemiform to more branched cymiform inflorescence-stalks; heads large, 25–40-flowered, broadly cylindrical to isodiametric, often with foliaceous phyllaries loosely erect and out-spreading, becoming squarrose-tipped in the majority of the varieties; achenes 5–6 mm. long. 32. *L. squarrosa.*

From Delaware to Tennessee, south to the Gulf of Mexico and west of the Mississippi through the central and western plains states to the Kansas-Colorado border and northward into South Dakota.

32. Liatris squarrosa (L.) Michx. Plants 3–6 dm. high from a rounded corm up to 4 cm. in diameter, with several to numerous stems, glabrous, soft-pubescent or hairy; leaves linear and rigid, punctate, glabrous or hirsute the radical sometimes very long, 15–25 cm. long, 4–7 mm. wide, the cauline 10–15 cm. long; inflorescence with one to few heads and raceme-like, or with many heads, branched and paniculate: heads almost isodiametric or elongate, 1.5–3 cm. long, 25–40-flowered (terminal ones frequently greatly exceeding the rest, up to 60-flowered), varying in width according to the spread of the phyllaries, sessile or on short pedicels; phyllaries foliaceous, glabrous or hirsute, ciliate-membranous or callose-margined, the inner in all varieties narrowly linear with acute tips, 1.5–2 cm. long and 1–2 mm. wide; outer ones elongate, triangular-lanceolate, often like reduced leaves, ciliate-margined; middle ones similar, acuminate and spreading, or broader, more closely appressed basally, mucronate and squarrose at the tip; corolla phlox-purple, 9–15 mm. long; inner surface of corolla-lobes conspicuously hairy; outer flowers of the head tending to be bent outwards approximately at mid-corolla length, thus giving the heads a broad, flat

top; stigmas sometimes white; achene 5–6 mm. long; pappus 7–12 cm. long.—Fl. Bor.-Am. ii. 92 (1803); Willd. Sp. Pl. iii. 1634 (1803); Pursh, Fl. Am. Sept. ii. 509 (1814); Torr. & Gray, Fl. N. Am. ii. 68 (1841), excl. var. δ; Gray, Synopt. Fl. i². 109 (1884), excl. var. *intermedia*. *Serratula squarrosa* L. Sp. Pl. 818 (1753). *Pteronia caroliniana* Walt. Fl. Carol. 202 (1788). *Laciniaria squarrosa* (L.) Hill, Veg. Syst. iv. 49, t. 46, fig. 1 (1762).

KEY TO VARIETIES

a. Stem, leaves and phyllaries with varying degrees of pubescence....b.
  b. Phyllaries long....c.
    c. Outer phyllaries acuminate, ciliate-margined, squarrose or spreading and leafy, middle and inner ones membranous-margined and squarrose or merely spreading; plants hispidulous with short, whitish hairs....d.
      d. Plants stout and much-branched, with numerous large, almost isodiametric, thick heads; phyllaries mostly squarrose.....var. *typica*.
      d. Plants of one or a few slender stems, bearing few, longer, more cylindrical heads.....var. *gracilenta*.
  b. Phyllaries short....e.
    e. Outer phyllaries acute, with or without ciliate margins, middle and inner ones acute, usually callose-margined and squarrose; heads cylindrical and variable in size var. *alabamensis*.
    e. Outer phyllaries a few, short, acute bracts, not foliaceous, middle ones appressed and abruptly mucronate into a definite cusp, squarrose and long-ciliate; heads small, neatly cylindrical; plants hirsute with longer tawny hairs; leaves narrowly linear.....var. *hirsuta*.
a. Stem, leaves, and phyllaries glabrous....f.
  f. Head surrounded by spreading, non-recurved, leaf-like bracts exceeding the length of the head; outer phyllaries acuminate, erect, middle and inner ones similarly elongate, linear, non-cuspidate, erect or spreading; heads sessile, frequently only a terminal one developing on a stem.....var. *compacta*.
  f. Heads lacking conspicuous, long, foliaceous outer bracts; outer phyllaries acute, squarrose or spreading, middle and inner ones narrow, callose-margined, cuspidate and recurved; heads on short pedicels and numerous.....var. *glabrata*.

Var. **typica.** Plants with dense, short, white hairs covering the stem and frequently both or only the lower surface of the generally 3–8-veined leaves, though leaves sometimes are quite glabrous; numerous heads on peduncles of various lengths giving the appearance often of a much-branched and "floribund" plant; outermost phyllaries leaf-like and spreading, narrowly lanceolate and hardly overlapping, frequently covered by and always fringed with white hairs; middle phyllaries lanceolate, pubescent or glabrous, sometimes membranous-margined, more frequently ciliate, closely imbricated, the long acuminate or mucronate tips (that in the outer ones decrease from one half to one quarter the length of the bract) sometimes becoming somewhat involute and

squarrose so that the over-all measurements of a head are almost the dimensions of a square; heads average 1.8 x 1.6 cm., 25–40-flowered; corolla ca. 15 mm. long, pappus 12 mm. long.—*Liatris squarrosa* β *floribunda* Torr. & Gray Fl. N. Am. ii. 68 (1841). *Liatris squarrosa* R. Sweet, Br. Fl. Gard. 2 ser. t. 44 (1823). *Vernonia hirsutiflora* Poiret, Encyc. Meth. Bot. viii. 502 (1808). *Liatris hirsutiflora* Kostel. Allg. Med. Pharm. Fl. ii. 651 (1833).

Delaware to northern Florida, westward to Alabama, Illinois and Missouri.—SOUTHERN STATES. Without stated locality: ex *Michx. Herb.* (NY). DELAWARE. Newcastle Co.: Wilmington, *W. M. Canby* (G). DISTRICT OF COLUMBIA. Without stated locality: July 29, 1893, *L. F. Ward* (US). MARYLAND. Queen Annes Co.: by roadside, near Centreville, Aug. 11, 1935, *H. A. Allard*, 834 (G, NY). Prince Georges Co.: Brooks Sta., Aug. 2, 1885, *Prof. Ward* (US). Charles Co.: Stump Neck, Aug. 6, 1942, *J. M. Turpin*, 475 (US). VIRGINIA. Without stated locality: 1878, *Dr. Foreman* (US). Fairfax Co.: in a field, n. side of Accotink Bay, Aug. 8, 1893, *L. F. Ward* (US); wooded hills of New Alexandria, Aug. 10, 1919, *E. C. Leonard*, 776 (US). Prince William Co.: Manassas, Sept. 18, 1907, *E. S. Steele* (US). Fauquier Co.: Catletts, Aug. 1, 1908, *Mrs. E. S. Steele* (US). Henrico Co.: dry sandy field, Westover Hills, July 21, 1936, *M. L. Fernald & B. Long*, 6415 (G, NY, US); near Richmond, July 19, 1935, *E. Luttrell*, 5679 (G); dry open pine woods, ¼ mi. w. of Elko, Aug. 8, 1921 (G), Aug. 16, 1921 (NY) *E. J. Grimes*, 4195 (G, NY); sandy oak and pine lands, Elko, Aug. 30, 1925, *E. T. Wherry & F. W. Pennell*, 12528 (NY); Whiteoak Swamp, w. of Elko, July 23, 1938, *M. L. Fernald & B. Long*, 8872 (G). Prince George Co.: s. of Petersburg, July 22, 1936, *M. L. Fernald & B. Long*, 6416 (NY). Campbell Co.: without stated locality, July 1893, *A. A. Heller* (G); Lynchburg, July 19, 1925, *W. A. Murrill* (F). Bedford Co.: roadside near Huddleston, Aug. 9, 1914, *Miss J. Fauntleroy*, 653 (US), Aug. 4, 1871, *A. H. Curtiss* ((G, plant to left), NY, Q). Dinwiddie Co.: dry, open, border of argillaceous woods, s. of Petersburg, July 15, 1938, *M. L. Fernald & B. Long*, 8871 (G). Prince Edward Co.: without stated locality, Aug. 25, 1880, *J. D. Smith* (US), Sept. 1885, *Prof. Blair*, 317 (US). Pittsylvania Co.: Fall Creek, July 20, 1893, *A. A. Heller*, 1111 (G, NY, US). Greensville Co.: old fields, vicinity of Belfield, July 1, 1904, *O. M. Meyncke* (US); Sprouse's Corners, Aug. 17, 1936, *Bartley & Pontius*, 540 (NY). Mecklenburg Co.: Finchley, Aug. 20–22, 1908, *W. W. Eggleston*, 4010 (G, NY, US). WEST VIRGINIA. Cabell Co.: Roland Park, near Huntington, July 23, 1937, *F. A. Gilbert*, 988 (G, NY); dry open field near Huntington, Sept. 20, 1931, *F. A. Gilbert*, 198 (G); dry field in clay soil, Roland Park, near Huntington, July 24, 1940, *F. A.*

Gilbert, 132 & 156 (NY, F without no.). NORTH CAROLINA. Granville Co.: Hester, July 23, 1937, *R. K. Godfrey* (G). Caswell Co.: roadside, 10 mis. n. of Yanceyville, July 31, 1938, *R. K. Godfrey*, 5592 (G). Guilford Co.: Greensboro, Aug. 14, 1903, *Biltmore Herb.*, 580j (US). Forsyth Co.: open woods, Winston Salem, Aug. 1, 1921, *P. O. Schallert* (G). Moore Co.: Pinehurst, Aug. 1897, *O. Katzenstein* (G). Gaston Co.: Crowder's Mt., July 29, 1902, *Biltmore Herb.*, 580h (US). Cleveland Co.: King's Mt., Aug. 27–30, 1884, *J. K. Small* (NY): slopes of King's Mt., July 1896, *J. K. Small* (NY). Scotland Co.: sandhill, 12 mis. north of Laurinburg, July 14, 1938, *R. K. Godfrey*, 5040 (G). New Hanover Co.: sand ridge at Carolina Beach, Aug. 7, 1938, *R. K. Godfrey*, 5906 (G). SOUTH CAROLINA. Lexington Co.: Columbia, *Gibbes* (G). Georgetown Co.: sandy woods, 3½ mis. s. of Georgetown, July 21, 1939, *R. K. Godfrey & R. M. Tryon*, 794 (G, NY). Aiken Co.: sand hills, Aiken, July 17, 1900, *Biltmore Herb.* 580d (US) and July 22, 1905, *Biltmore Herb.*, 580p (US). Charleston Co.: sandy place, McClellanville, Sept. 2, 1940, *P. O. Schallert* (G). Beaufort Co.: Beaufort district, 1883, *J. H. Mellichamp* (US). GEORGIA. Walker Co.: dry soil, open woodlands, Chickamauga Park, July 14, 1899, *Biltmore Herb.*, 580c (US). Bibb Co.: dry soil, Macon, July 31, 1901, *Biltmore Herb.*, 580g (US). Richmond Co.: dry oak woods, Augusta, July 31, 1898, *A. Cuthbert* (NY, US, F). FLORIDA. Gadsden Co.: pinelands, River Junction, Aug. 31, 1901, *Biltmore Herb.*, 580f (US). OHIO. Without stated locality: 1834, *Riddell* (G, NY). Erie Co.: cemetery, Castalia, July 21, 1895, *E. L. Moseley* (G, US). Lucas Co.: oak openings, n. e. of Neapolis, Aug. 26, 1927, *E. L. Moseley* (US). Adams Co.: without stated locality, July 27, 1940, *D. M. Brown* (NY). INDIANA. Clarke Co.: dry open knobs, July 30, 1909, *C. C. Deam*, 5408 (NY). KENTUCKY. Meade Co.: near Brandenburg, Aug. 9, 1928, *W. A. Anderson* (G). Calloway Co.: dry field, between Murray and New Concord, July 20, 1937, *L. B. Smith & A. R. Hodgdon*, 4089 (G, NY, US). TENNESSEE. Without stated locality: 1870, *G. R. Vasey* (US). Grainger Co.: Clinch Mt., Aug. 12, 1880, *J. D. Smith* (US). Cheatham Co.: dry shale banks, Pegram, Aug. 20, 1940, *H. K. Svenson*, 10607 (B). Knox Co.: open ground, near Knoxville, July 12, 1900, *A. Ruth*, 41 (G); dry sandy soil, Knoxville, June 1896, *A. Ruth*, 37 (NY); sandy ground, Knoxville, June 1897, *A. Ruth*, 3772 (NY); mt. sides, Smoky Mt. Range, Sept. 1897, *A. Ruth*, 3773 (NY); Knoxville, June 1898, *A. Ruth*, 659 (US); dry ground, Aug. 1898, *A. Ruth*, 676 (NY); near Young's High School, Knoxville, Aug. 2, 1934, *M. B. Wilson*, 2968 (NY). Roane Co.: Harriman, Aug. 18, 1909, *Biltmore Herb.*, 580i (US). Grundy Co.: near Monteagle, Sept. 23,

1933, *E. J. Alexander, T. H. Everett, S. D. Pearson* (NY). ALABAMA. Co. undetermined: dry sandy pine ridges (two plants to right), Sept. 1878, *C. Mohr* (US). Barbour Co.: dry oakwoods-border, 8 mis. s. of Eufaula, Aug. 11, 1927, *K. M. Wiegand & W. E. Manning*, 3177 (G). Escambia Co.: high pineland, Atmore, July 11, 1934, *O. Blanton*, 193 (US). Mobile Co.: pine barrens, w. of Spring Hill, Aug. 1918, *E. W. Graves*, 589 (G); pine barrens, July 1918, *E. W. Graves*, 558b (US). ILLINOIS. Co. undetermined: south Illinois, *G. Vasey*, 1210 (G). Richland Co.: Olney, July 29, 1914, *R. Ridgway*, 91 (G); near Olney, Sept. 6, 1914, *R. Ridgway* (G). Marion Co.: without stated locality, *M. S. Bebb* (G). Perry Co.: Du Quoin, Aug. 4, 1893, *H. Eggert* (NY, US); prairies, Aug. 4, 1893, *H. Eggert* (US). MISSOURI. Stoddard Co.: Bernie, Aug. 2, 1895, *B. F. Bush*, 235 (NY).

Var. **gracilenta,** var. nov., molliter pubescens vel rarius fere glabra gracilis; caulibus singulis vel paucis raro ramosis capitula sessilia vel subsessilia plerumque 1–5 gerentibus; foliis plerumque longis angustisque, radicalibus ad 25 cm. longis 4 mm. latis; capitulis elongatis cylindricis plerumque 1.9 cm. longis 1.2 cm. latis ca. 25-floris; phyllariis longe lanceolato-acuminatis apice laxe patentibus nec recurvatis, exterioribus 1–1.5 cm. longis 2 mm. latis, medianis 2 cm. longis basi apicis subspathulati 4–5 mm. latis; corollae tubo ca. 15 mm. longo; pappo 12 mm. longo.—Verisimiliter *L. squarrosa* sensu Ell. Sk. ii. 282 (1822?).

Type from Ocean Springs, Jackson Co., Mississippi, Aug. 11, 1895, *J. S. Skehan* (G).

Mostly from south Georgia, Florida, Alabama, Mississippi and Louisiana.—Without stated locality:[1] *Drummond*, 172 "A. & L." (G). VIRGINIA. Bedford Co.: without stated locality: Aug. 4, 1871, *A. H. Curtiss* (plant to right) (G). NORTH CAROLINA. Madison Co.: Marshall, French Broad River, Aug. 7, 1880, *J. D. Smith* (US); Hot Springs, Aug. 13, 1888, *B. W. Evermann* (US, 617885 and 310560). Buncombe Co.: dry soil, Biltmore, July 30, 1897, *Biltmore Herb.*, 580a (G, NY, US 332424 and 959080); Biltmore, Aug. 1894, *Biltmore Herb.*, 580 (US, 959081); Cedar Cliff Mt., Aug. 17, 1904, *Biltmore Herb.* 580m (US). GEORGIA. Walker Co.: dry soil, open woodlands, Chickamauga Park, July 14, 1899, *Biltmore Herb.*, 580c (US). Floyd Co.: Lavender Mt., Rome, Aug. Herb. Chapman (US). Gwinnett Co.: Banks of Yellow R., July 20, 1893, *J. K. Small* (G). FLORIDA. Without stated locality: *Chapman* (NY, US). Washington Co.: dry rolling pine barrens, near Chipley, July 28, 1901, *A. H. Curtiss* 6849 (G, NY, US, Q). KENTUCKY. Co. undetermined: barrens of Kentucky, July

[1] Though probably from Covington, La. (see footnote under discussion of this species).

1837, *C. W. Short* (G). ALABAMA. Co. undetermined: dry sandy pine ridges (one plant to left), Sept. 1878, *C. Mohr* (G). Co. undetermined: dry sandy pine ridges (one plant to left), Sept. 1878, *C. Mohr* (US). Washington Co.: low pine barrens (one plant to right) June 15, 1895, *C. Mohr* (US). MISSISSIPPI. Copiah Co.: 2 mis. s. of Hazelhurst, July 14, 1925, *F. Cook* (US). Jackson Co.: Ocean Springs, Aug. 11, 1895, *J. Skehan* 1353 (G, type); Ocean Springs, July 27, 1896, *C. L. Pollard*, 1082 (US); Biloxi, Sept. 4, 1900, *S. M. Tracy*, 487 (NY). Harrison Co.: sandy pineland, 1 mi. e. of Mississippi City, Aug. 27, 1912, *F. W. Pennell*, 4347 (NY, US); grassy pine barrens, near Mississippi City, Sept. 15, 1885, *J. D. Smith* 424 (US). MISSOURI. Butler Co.: Malden, Aug. 21, 1894, *B. F. Bush* 386 (G, NY). Greene Co.: dry rocky woods, Aug. 6, 1895, *J. W. Blankinship* (G). LOUISIANA. Without stated locality: *ex Herb. C. W. Short, Mr. Steinhauer* (G). Natchitoches Co.: Natchez, *C. Wright* (G). Rapides Co.: pinelands, Sept. 10, 1900, *Biltmore Herb.*, 580e (two outermost plants) (US). Tangipahoa Co.: dry soil, s. of Hammond, June 20, 1938, *D. S. Correll & H. B. Correll*, 9255 (G, NY). St. Tammany Co.: vicinity of Covington, Aug. 20, 1920, *Bro. G. Arsène*, 12614 (US); vicinity of Covington, July 1919, *Bro. G. Arsène*, 11665 (US); Covington, 1832, *Drummond* (NY). TEXAS. Jackson Co.: 4 mis. n. of Edna, July 1935, *J. A. Drushel*, 10339 (NY). Newton Co.: without stated locality, July 23, 1939, *B. C. Tharp* (G).

Var. **alabamensis** (Alex.), comb. nov. Plants that appear to be intermediate between varieties *gracilenta* and *glabrata*, with stems and leaves and outer phyllaries glabrous or softly pubescent; outer phyllaries spreading or slightly squarrose, triangular-lanceolate-acuminate 5–8 mm. long and 3–5 mm. wide and ciliate-margined; middle phyllaries glabrous, more sharply pointed and cellose-margined, 1–1.5 cm. long and 5 mm. wide; heads from 1.5–2 cm. long and 1–1.5 cm. wide, of about 30 flowers; corolla 10–12 mm. long; pappus ca. 1 cm. long.—*Laciniaria squarrosa alabamensis* Alex. ex Small Man. S. E. Fl. 1333 (1933) without indication of status.

Alabama, Mississippi, Louisiana and eastern Texas.—ALABAMA. Hale Co.: dry chalk prairies, ½ mi. w. n. w. of Rosemary, Aug. 23, 1934, *R. M. Harper*, 3252 (G, NY, US); chalk prairies, 5 mis. s. of Newbern, Aug. 1, 1938, *H. K. Svenson & R. M. Harper* 9801 (G). Lee Co.: Auburn, Aug. 11, 1897, *F. S. Earle & C. F. Baker*, 1344 (NY, type). Escambia Co.: high pineland, Atmore, July 11, 1934, *O. Blanton*, 183 (G). MISSISSIPPI. Oktibbeha Co.: Agric. College, 1896, *C. L. Pollard*, 1318 (G, NY (US, plant to left)). Jackson Co.: Ocean Springs, July 27, 1896, *C. L. Pollard*, 1082 (NY, US); Sept. 1, 1891, *A. B. Seymour*, 193 (G); Biloxi, *S. M. Tracy*, July 31, 1900, 4334 (G),

Aug. 31, 1900, 9734 (US); Aug. 23, 1898, 4335 (NY, US). LOUISIANA. Without stated locality: *ex Herb. G. Thurber, S. T. Olney* (G). Rapides Co.: pinelands (centre plant), Sept. 10, 1900, *Biltmore Herb.*, 580e (US). Jefferson Davis Co.: low prairies, Welsh, Sept. 10, 1915, *E. J. Palmer*, 8484 (US). TEXAS. Polk Co.: dry upland woods, Livingston, Sept. 19, 1917, *E. J. Palmer*, 12802 (US). Walker Co.: without stated locality, Aug. 1, 1937, *B. C. Tharp* (G). Brazos Co.: Bryan, Aug. 17, 1903, *Biltmore Herb.*, 580i (US); College Station, 1888, *Herb. Boston, Soc. Nat. Hist., Mr. P* (G). Washington Co.: without stated locality, Aug. 1, 1938, *Miss E. Brackett* (G). Bastrop Co.: clay banks, Bestrop, 1930, *H. H. Duval*, 24 (G); without stated locality, Aug. 22, 1941, *B. C. Tharp*, 188 (G). Harris Co.: Houston, 1842, *Lindheimer* (G). DeWitt Co.: without stated locality, July 5, 1942, *B. C. Tharp* (G); western DeWitt, July 25, 1941, *Miss M. Riedel* (G). Fayette Co.: near Schulenberg, Aug. 2, 1935, *H. B. Parks*, 14559 (G). Galveston Co.: Kemah, Sept. 6, 1926, *G. L. Fisher*, 261 (US).

Var. **hirsuta** Rydb. Plants with hirsute stems and hirsute, narrow, 1–3-veined leaves and long-ciliate-margined phyllaries; few outermost phyllaries may be narrowly lanceolate but most are broadly oblong, narrowing abruptly into long cusp-like tips that alone are strongly reflexed giving the head of ca. 20 flowers a more compact, narrow, cylindrical appearance, averaging 1.3 x 1 cm.; outer phyllaries 0.7–1 cm. long and 4–5 mm. wide; middle ones 1–1.3 cm. long and 3–4 mm. wide; corolla ca. 1 cm. long; pappus 8 mm. long.—*Liatris hirsuta* Rydb. Brittonia i. 98 (1931). *L. squarrosa* var. *hirsuta* Rydb. l. c. 99 in synon.; here accepted and validated. *L. squarrosa hirsuta* (Rydb.) F. C. Gates, Trans. Kans. Acad. Sci. xlii. 138 (1940), without indication of status.

Chiefly west of the Mississippi in the Ozarks of Missouri and the western mountainous regions of Arkansas; also in eastern Kansas and Oklahoma.—KENTUCKY. Co. undetermined: barrens of Kentucky, July 1871, *W. M. Canby* (G). MISSISSIPPI. Holmes Co.: without stated locality, Aug. 10, 1893, *S. M. Tracy* (NY). IOWA. Palo Alto Co.: high prairie hilltop, s. of Virgin Lake, Highland Twsp., Sect. 30, Sept. 16, 1937, *Miss A. Hayden*, 10533 (G, NY). MISSOURI. Mercer Co.: dry open woods, 5 mis. s. w. of Linesville, July 5, 1933, *E. J. Palmer & J. A. Steyermark*, 41312 (NY, US). Adair Co.: dry banks, open woods, 4 mis. n. of Kirksville, July 3, 1933, *E. J. Palmer & J. A. Steyermark*, 41174 (NY). Jackson Co.: prairies, Lee's Summit, July 25, 1905, *B. F. Bush*, 3096a (G, NY, US); Little Blue, July 22, 1896, *B. F. Bush*, 454 (US); dry hills, e. of Dodson, July 26, 1896, *K. K. Mackenzie* (NY). Cass Co.: barrens, west of Belton, Aug. 4, 1902, *K. K. MacKenzie*, 97 (US,

NY). Vernon Co.: dry banks, border of woods, along creek near Nevada, Aug. 6, 1933, *E. J. Palmer & J. A. Steyermark* 42138 (US, NY). Polk Co.: vicinity of Graydon Springs, Sept. 7, 1912, *P. C. Standley*, 9909 (US); on top of cherty lime barren, on steep slopes along Pomme de Terre R., 2 mis. n. e. of Rondo, Aug. 1, 1937, *J. A. Steyermark*, 24097 (NY). Greene Co.: vicinity of Willard, Aug. 30, 1912, *P. C. Standley*, 9665 (US); dry ground, Sept. 4, 1893, *B. F. Bush*, 197 (NY); Springfield, 1888, *J. W. Blankinship* (US); along Rwy., n. e. of town, vicinity of Springfield, Sept. 1, 1921, *P. C. Standley*, 8622 (G, US). Jasper Co.: rocky open ground, n. fork of Spring River, near Neck City, Sept. 21, 1923, *E. J. Palmer*, 23863 (NY); high prairies, Sarcoxie, July 15, 1914, *E. J. Palmer*, 6261 (US). Barry Co.: Purdy, Aug. 17, 1905, *B. F. Bush*, 3254 (G, NY); Shell Mound, July 11, 1927, *E. J. Palmer*, 3244 (NY); Hailey, Sept. 15, 1905, *J. W. Phillips* (US); rocky slopes, open woods, near Seligman, Oct. 24, 1925, *E. J. Palmer*, 29370 (G); woods, Eagle Rock, Aug. 11, 1905, *B. F. Bush*, 3217 (G, NY, US). Newton Co.: along chert bluffs of Shoal Creek, near Redding's Mill, July 14, 1927, *E. J. Palmer*, 32505 (NY, type); Joplin, Sept. 8, 1912, *E. J. Palmer*, 3836 (NY, US). Taney Co.: rocky woods, Swan, Sept. 27, 1905, *B. F. Bush*, 3467 (G). McDonald Co.: dry ground, *B. F. Bush*, July 24, 1893, 200A (G), Sept. 1, 1893, 200B (US). ARKANSAS. Co. undetermined: Red River, *ex Torrey Herb., Dr. Pitcher* (NY); n. w. Arkansas, Sept., *F. L. Harvey*, 14 (G). Carroll Co.: dry hillsides, Eureka Springs, Sept. 30, 1913, *E. J. Palmer*, 4531 (US). Pulaski Co.: dry ledges, open woods, w. of Pulaski Heights, Little Rock, Sept. 21, 1931, *D. Demaree*, 8219 (G, NY); near Little Rock, *G. W. Letterman* (NY). Yell Co.: dry soil, Mt. Nebo, Aug. 4, 1903, *Biltmore Herb.*, 580k (US). Garland Co.: open dry woods, end of Whitington Ave., Hot Springs, Aug. 25, 1935, *F. J. Scully*, 461, 462 (G); open woods, Glenwood Road, 8 mis. from Hot Springs, July 21, 1935, *F. J. Scully*, 386 (G); near Hot Springs, 1928, *R. Runyon*, 1179a (NY). LOUISIANA. Natchitoches Co.: dry sandy hills, 3 mis. s. of Coldwater, July 26, 1938, *D. S. Correll & H. B. Correll* 9811 (G, NY); sandy open woods, Oct. 9, 1915, *E. J. Palmer*, 8800 (US). NEBRASKA. Co. undetermined: prairies, Aug. 4, 1853, *T. E. Hayden* (NY). KANSAS. Co. undetermined: Wolf Creek to Independence Creek, July 30, 1849, *A. Fendler* (G). Atchison Co.: prairie, 12 mis. w. of Atchison, July 18, 1936, *Sister Jeanette*, 150 (NY). Riley Co.: Manhattan, Aug. 9, 1892, *J. B. S. Norton* (US). Douglas Co.: without stated locality, Aug. 1870, *L. H. Hoysradt* (NY). Montgomery Co.: Caney, open dry banks, July 21, 1933, *E. J. Palmer*, 41795 (NY). OKLAHOMA. Co. undetermined: Sans

Bois Mts., Aug. 1891, *C. S. Sheldon*, 304 (US); prairies,[1] Aug. 26, 1853, *Lieut. A. W. Whipple's Exped., J. M. Bigelow* (US); Camp no. 4, N. W. Agency[1], July 28, 1853, *Bigelow* (NY); Camp no. 4[1], July 28, 1853, *Bigelow*, 357 (NY). NOWATA Co.: on dry hill-top, Lenapah, Aug. 19, 1913, *G. W. Stevens*, 2175 (G, US). CHEROKEE Co.: dry rocky woodlands, Aug. 18, 1895, *J. W. Blankinship* (G, US). LE FLORE Co.: Cavanal Mt., Poteau, Oct. 28, 1915, *E. J. Palmer*, 9059 (US). PUSHMATAHA Co.: sandy meadow, Tuskahoma, June 20, 1937, *U. T. Waterfall* (NY).

Var. COMPACTA Torr. & Gray. Glabrous plants with shining narrowly linear, leaves 2–3 mm. (occasionally up to 1 cm.) wide; heads of 20–40 flowers, generally sessile, generally borne singly and terminally on the stems, surrounded by long foliaceous bracts twice the length of the head, 5 cm. long, 2–4 mm. wide; phyllaries all completely glabrous, leaf-like, elongate, acuminate to cuspidate and spreading, but not squarrose at any time: outer ones 1–2 cm. long and 4 mm. wide; middle ones linear, 1.5–2 cm. long and 2–3 mm. wide; corolla ca. 1 cm. long; pappus 7–8 mm. long.—Fl. N. Am. ii. 68 (1841). *Liatris compacta* Rydb., Brittonia i. 98 (1931).

Observed from Arkansas only.—COUNTY UNDETERMINED: *Dr. Leavenworth* (G, NY, type. Perhaps from Louisiana). PULASKI Co.: Little Rock, Sept. 30, 1931, *D. Demaree*, 8338 (US). GARLAND Co.: Hot Springs, novaculite outcrops, slopes of Hot Springs Mt., Oct. 9, 1925, *E. J. Palmer*, 29057 (NY), rocky top of West Mt., June 4, 1923, *Palmer* 23061, grassy patches on novaculite rubble slope, June 18, 1933, *H. R. Gregg*, 38 (US), 1931, *R. Runyon*, 1442 (US), dry sandstone hills, July, 1880, *F. L. Harvey*, 42 (G), dry, rocky ground, slopes of West Mt., Oct. 15, 1925, *Palmer*, 29230 (NY); rocky bluff, Camp Charlton, Crystal Springs, June 14, 1942, *Demaree*, 23215 (G). HOT SPRING Co.: rocky bluffs, Magnet Cove, May 1, 1938, *Demaree*, 17252 (G, NY).

Var. **glabrata** (Rydb.), comb. nov. Plants entirely glabrous with rigid narrow 1–3-veined leaves and phyllaries narrower than in var. *hirsuta*, short, acuminate, or cuspidate, callose-margined, and recurved after flowers have opened though they may be quite erect before that time; outer ones triangular-lanceolate, 0.7–1 cm. long; middle ones 1–1.5 cm. long and 4 mm. wide: heads trim, without the long foliaceous outermost bracts of vars. *compacta* and *typica*, averaging 1.3 x 1 cm., of 20–30 flowers; corolla ca. 1 cm. long; pappus 7–8 mm. long.—*Liatris glabrata* Rydb. Brittonia i. 98 (1931). *L. squarrosa glabrata* (Rydb.) F. C.

[1] According to Bigelow—Report on Lieut. Whipple's Expedition (1857) p. 96, Sect. 4, *L. squarrosa* was said to have been found on the prairies, August 26. From the map and notes the party followed the Canadian River, practically all of which lies in Oklahoma.

Gates, Trans. Kans. Sci. xlii. 138 (1940) without indication of status.

In the plains-states, South Dakota to Texas, west to the Colorado border of Kansas and east to Missouri.—MISSOURI. GREENE Co.: dry rocky woods, Aug. 7, 1895, *J. W. Blankinship* (G); prairies, n. e. of Springfield, Aug. 21, 1912, *P. C. Standley*, 9113 (US). ARKANSAS. BARTON Co.: Plum Buttes on Arkansas R., near Great Bend,[1] 1846, *Lieut. Abert's Exped.* (NY). SOUTH DAKOTA. STANLEY Co.: banks of Mo., below Fort Pierre, 1853, *F. V. Hayden* (NY). TODD Co.: high land, Rosebud Creek, July 2, 1896, *E. J. Wallace* (NY); Rosebud, *E. J. Wallace* (US). BENNETT Co.: sandhills, near La Creek P. O., Aug. 12, 1911, *S. S. Visher*, 2232 (NY). NEBRASKA. Co. undetermined: Platte R., near the Forks, *Herb. G. Thurber, H. Engelmann* (G); Platte R.,[2] *Lieut. Fremont* (G, NY). KNOX Co.: Pisheville, Aug. 18, 1893, *F. Clements*, 2734 (G, NY, US); Fort Niobrara, June 25, 1888, *T. E. Wilcox* (NY); Niobrara Game Reserve, near Valentine, July 22, 1936, *W. L. Tolstead*, 527 (G). KEYAPAHA Co.: Cuba, 1908, *J. S. Haller* (US). ROCK Co.: without stated locality, Aug. 26, 1890, *C. Rutter* (US). BROWN Co.: Long Pine, *G. D. Swezey*, 52 (NY). THOMAS Co.: near Plummer Ford, Dismal River, Aug. 23, 1893, *P. A. Rydberg*, 1505 (G, (NY, type), US)). GRANT Co.: lake region, 4 mis. n. e. of Whitman, 1893, *P. A. Rydberg*, 1505 (G, NY). CUSTER Co.: Callaway, Aug. 17, 1902, *J. M. Bates* (G). BUFFALO Co.: Fort Kearney, Platte R., 1856, *H. Engelmann* (G). KANSAS. POTTAWATOMIE Co.: without stated locality, Sept. 1, 1892, *S. Norton* (NY). RILEY Co.: low woods, Aug. 9, 1895, *J. B. Norton*, 278 (G); prairie, July 18, 1895, *J. B. Norton*, 212 (US). GEARY Co.: Fort Riley, July 20, 1892, *E. E. Gayle*, 542 (NY). ELLSWORTH Co.: near Ellsworth, Aug. 2, 1930, *E. J. Palmer*, 38167 (G, US). FINNEY Co.: 2 mis. s. e. of Garden City, Kansas Nat. Forest, Aug. 1912, *Kellerman* (US). RENO Co.: without stated locality, July 1891, *M. A. Carlton*, 290 (US). KIOWA Co.: Greensburg, Aug. 5, 1890, *B. B. Smyth*, 74 (US). OKLAHOMA. Co. undetermined: Sans Bois Mts., Aug. 21, 1891, *C. S. Sheldon* (NY); tributaries of Washita, 1852, *Marcy's Exped., ex Herb. G. Thurber* (G). OSAGE Co.: open woods, near Ponca, Aug. 6, 1913, *G. W. Stevens*, 1924 (G). WOODWARD Co.: sandy soil, Woodward, Aug. 21, 1931, *L. F. Locke*, 11 (US). PAYNE Co.: Stillwater, July 5, 1896, *E. E. Bogue* (G), 1918,

[1] From notes of a military reconnaissance from Fort Leavenworth in Missouri to San Diego in California, including part of the Arkansas, Del Norte & Gila Rivers, by Lieut. Abert, appendix 6, p. 386, and map, this collection would come from the Bend of the Arkansas R., just where Walnut Creek enters it, in Barton County.

[2] The Report Fremont's Expedition, Washington, 1845, p. 90 of Catalogue of Plants, refers without date to "*L. squarrosa* var. *intermedia* DC. a small form of the plant on the Platte"—which probably refers to these specimens.

F. A. Waugh, 284 (US). DEWEY Co.: dry open ground, plains near Taloga, July 26, 1933, *E. J. Palmer*, 41957 (P). LINCOLN Co.: Fonts, Aug. 28, 1895, *J. W. Blankinship* (G, US). OKLAHOMA Co.: sandy clay, sandstone hills, n. w. of Spencer, Aug. 6, 1939, *U. T. Waterfall*, 1551 (G); sandy soil, 2 mis. w. of Nicoma Park, Aug. 9, 1940, *U. T. Waterfall*, 2343 (G). CADDO Co.: Anadarko, July 17, 1891, *C. S. Sheldon*, 168 (US); without stated locality, June 27, 1903, *A. H. Van Fleet* (US); between Fort Cobb & Fort Arbuckle, 1868, *E. J. Palmer*, 469 (US). ATOKA Co.: gravelly hillside, Stringtown, June 25, 1891, *C. S. Sheldon*, 68 (US). BRYAN Co.: vicinity of Durant, 1931, *W. L. Blain*, 220 (US). TEXAS. DALLAS Co.: sandy soil, near Dallas, June 1882, *J. Reverchon, Herb. Curtiss*, 1171a (G, US); Dallas, July 1874, *J. Reverchon* (G); sandy woods, Dallas, June 1880, *J. Reverchon*, 409 (US); dry uplands, Dallas, Sept. 1877, *J. Reverchon*, 412 (US). TARRANT Co.: in sandy soil, along right of way, T. & P. Rwy., near Handley, July 28, 1913, *A. Ruth*, 404 (US 504842); along T. & P. Rwy., near Polytechnic, July 28, 1913, *A. Ruth*, 404 (US, 910626); meadows, July 1913, *A. Ruth*, 404 (US, 587685); without stated locality, May 1928, *A. Ruth*, 403 (US). WALKER Co.: on blackland prairie, vicinity of Huntsville, July 9–12, 1909, *R. A. Dixon*, 398 (G). COLORADO. Co. undetermined: prairies on the Arkansas[1] below Turkey Creek, Sept. 1847, *A. Fendler*, 298 (G). YUMA Co.: Wray, Aug. 11, 1913, *W. W. Eggleston*, 15534 (G, NY), Aug. 5, 1909, *G. E. Osterhout*, 3991 (NY), July 1–4, 1919, *W. W. Eggleston*, 15173 (US), July 2, 1910, *H. L. Shantz* (US).

The type of *Liatris squarrosa* is the Linnaean specimen, a photograph of which was seen at the Gray Herbarium, as was also one of the specimen back of the reference to the Hortus Cliffortianus. These specimens represent a generally leafy plant, of a branched appearance, with pubescent stems and leaves and squarrose or spreading bracts (var. *floribunda* of Torr. & Gray). From this typical variety, occurring chiefly in Virginia and North and South Carolina, can be distinguished a more slender, fewer- and longer-leaved, generally slightly pubescent plant having fewer heads (1–5) with erect lanceolate rather than squarrose phyllaries, which predominates in the region just north of the Gulf of Mexico, in southern Georgia, Alabama, Mississippi and Louisiana, which we are calling var. *gracilenta*. The wholly glabrous plant with long, acuminate phyllaries is Torrey &

[1] From Plant. Fendl. Mem. Amer. Acad. Ser. 2, iv. 1–116 (1849), this is the place and time of collection of no. 298, and the route followed through September was from Bent's Fort, now in Otero Co., to the Raton Mts. in Las Animas Co.

Gray's var. *compacta*, later reduced by Gray to var. *intermedia*, a variety open to question.

The more common variety of the species in the states just west of the Mississippi is a hirsute plant, described by Rydberg l. c. as *Liatris hirsuta*. It is generally less branching and by reason of its narrower leaves, less foliaceous in appearance than var. *typica*. The distinctly long-ciliate-margined phyllaries, except for a few outermost spreading ones, are tightly appressed with only the long cuspidate tips recurved. Extending from Texas farther westward and northward in the plains states is a slender glabrous variety, without the conspicuous long acuminate bracts of var. *compacta*, but with squarrose callose-margined phyllaries that Rydberg l. c. described as *Liatris glabrata*. In synonymy with this he placed var. *intermedia* of Gray, Synopt. Fl. i^2. 109 (1884) in part, as to description.

It is obvious that much confusion in this species has arisen from the failure properly to place *Liatris intermedia* as described by Lindley (Bot. Reg. t. 948 (1825)) from a plant brought to the Horticultural Society in 1824 by David Douglas and grown from roots collected in Canada by Mr. Goldie who also had pressed specimens of it. From the Journal kept by Douglas during his travels in North America, 1823–27 (Wm. Wesley & Son, 364 pages), it is found that he collected in the vicinity of Amherstburg and Sandwich, now in Essex county, in the southwestern part of the Ontario peninsula. From the examination of Lindley's plate, the plant collected by Douglas strongly resembles *Liatris cylindracea*. Especially do the typical cylindrical younger heads before opening of the flowers place it with *L. cylindracea* rather than *L. squarrosa*, which would show recurved or spreading bracts at the same age. Examination of various herbaria for specimens collected in Ontario has not disclosed any *L. squarrosa* found in the province, though *L. cylindracea* has been collected along the shores of Lake Erie and Lake Huron north to Manitoulin Island, and from the northwest shore of Lake Ontario. The matter was further confused when Hooker, in Flor. Bor.-Amer. i. 306 (1834), listed only *L. scariosa*, *L. punctata* and *L. squarrosa*, giving Canada as habitat for the last species and referring to Mr. Goldie as the collector. In the note under *L. squarrosa* he states: "I fear the *L. intermedia* of the Bot. Reg.

can only be considered a luxuriant state of the present. Mr. Goldie's original specimens in my Herbarium do not at all differ from the true *squarrosa;* and the cultivated individual only exhibits longer flower-stalks". Macoun (Cat. Can. Plants i. 542 (1886)) included *L. squarrosa*, but gave "western Ontario. (*Gray.*)" as the only reference, adding "not noticed by any of the late collectors" and for var. *intermedia* he stated "same situation as the type. (*Gray.*) Not lately collected". Though neither Lindley's plant nor the original herbarium specimen from Canada has been seen, by the plate, description and locality of collection, *L. intermedia* has been placed in the synonymy of *L. cylindracea.* The range of *L. squarrosa* does not include Canada.

Though we believe six varieties of *L. squarrosa* can be distinguished, many intermediates are found, especially where two varieties coincide geographically. So, in the Southern Appalachian region, as in Georgia, where one finds var. *typica* and also var. *gracilenta*, of more southern range, there are more plants of 5–9 heads that are clearly intermediates between the two varieties. In numerous cases specimens show combined characters of both varieties and some of these intergradations have been listed below. Sometimes, specimens of the same number in various herbaria suggest two different varieties, as *R. M. Harper*, no. 273, from Rocky Face Mt., Whitfield Co., Ga., July 21, 1900, of which those at Gray and the New York Botanical Garden resemble var. *typica* and that at Washington, more nearly var. *gracilenta.*

Intermediates between *L. squarrosa* var. *typica* and var. *gracilenta.* NORTH CAROLINA. Iredell Co.: Statesville, July, 1878, *M. E. Hyams* (US). GEORGIA: Whitfield Co.: dry sandy field, s. end of Rocky Face Mt., July 21, 1900, *R. M. Harper*, 273 (G, NY, US). Hart Co.: dry oak woods, 4 mis. s. of Hartwell, Aug. 19, 1927, *K. M. Wiegand & W. E. Manning*, 3178 (G). Gwinnett Co.: banks of Yellow River, July 20, 1893, *J. K. Small* (NY, US). Chattahoochee Co.: Chattahoochee River, Fort Benning Military Reserve, July 7, 1926, *J. O. Andes*, 2910 (NY). Sumter Co.: dry pine barrens s. of Leslie, July 13, 1901, *R. M. Harper*, 1066 (G, NY, US). FLORIDA. Without stated locality: *Chapman ex Torrey Herb.* (NY), *Chapman ex. Herb. Thurber* (G). Liberty Co.: damp woods, on the road from Quincy to Aspalaga and Chattahoochee, *Chapman. ex. Herb. J. A. Lowell* (G). KENTUCKY. Without stated locality: 1842, *C. W. Short* (NY). Co. undetermined:

Green River region, Aug. 21, 1895, *J. N. Rose* (US); Whitley Co.: cliffs of the waterfall, Cumberland Falls, Aug. 21, 1883, *J. D. Smith* (US). ALABAMA. Clay Co.: Elders, July 29, 1896, *C. Mohr* (US). Washington Co.: low pine barrens, June 15, 1895, *C. Mohr* (one plant to left) (US). Mobile Co.: in woods, Spring Hill, Aug. 20, 1897, *B. F. Bush*, 155 (NY, US). MISSISSIPPI. Oktibbeha Co.: Agricultural College, Aug. 11–17, 1896, *C. L. Pollard*, 1318 (plant to right, US).

In Mississippi and Louisiana, var. *gracilenta* is the dominant variety (though again there are some intermediates) and generally it is softly pubescent. However, sometimes it is an almost glabrous, tall slender plant, e. g. *C. L. Pollard*, no. 1082, from Ocean Springs, Jackson Co., Miss. (US), or *Arsène*, no. 12614, from the vicinity of Covington, St. Tammany Parish, La. (US). Yet for the distinctly glabrous, long-foliaceous-bracted plant described by Torrey and Gray l. c. as var. *compacta* from a plant collected by Leavenworth, in "Arkansas or Louisiana" (G, NY), I have found no exact match. The description, "glabrous; leaves crowded, very narrow, heads several, closely sessile, approximate", excludes these Louisiana and Mississippi specimens, since most of them are not wholly glabrous and have heads quite distant, even sometimes pedunculate as seen also in the Drummond specimens (G, NY), and referred to by Hooker[1] (1835). But in a limited range, in Arkansas, I have found glabrous specimens varying from the *compacta* type only in having slightly wider leaves and phyllaries. As these seem very distinctive and nearest to the Leavenworth specimens, I have included them with it in var. *compacta;* the Louisiana and Mississippi plants seem more adequately placed with var. *gracilenta.* The other glabrous variety, with shorter, recurved phyllaries, is the only prevalent one in the western plains-states, and in going from Louisiana westward through Texas, one finds the glabrous form with the shorter phyllaries becoming increasingly abundant. In southeastern Texas, where var. *glabrata* finds its eastern limit, one often sees specimens approaching it in the character of the phyllaries, yet perhaps with softly pubescent stem and sometimes much-branched inflorescence as in *E. J. Palmer*, no. 12802, from

[1] W. J. Hooker—Companion to the Botanical Magazine. Nov. 1835, p. 95, "no. 410 *Liatris squarrosa* Willd.—Covington. β floribus longius pedicellatis involucri squamis appressis vix squarrosis, . . . This is a very remarkable variety but I do not think it can be separated from *L. squarrosa*".

Livingston, Polk Co. (US), or *G. L. Fisher*, no. 261, from Kemah, Galveston Co., Texas (US). These seem understandable as intermediates between the western var. *glabrata* and the southern var. *gracilenta* where the two varieties have met. In specimens from the Mississippi and Alabama region, varying degrees of pubescence are found in combination with a number of modifications of spreading or recurved, callose-margined phyllaries and in intermediacy in the size of the heads. Such phases we believe were described by Alexander as *Laciniaria squarrosa alabamensis*. Though it seems rather difficult to limit this variety with such varying intermediate expressions, we are retaining it here. Further to the north and west, in Kansas and Oklahoma, some specimens are again intermediate between var. *glabrata* and var. *compacta*, as can be seen in the specimens: *M. A. Carleton* no. 290, without locality, Reno Co., Kans. (US), or *U. T. Waterfall*, no. 107 from poor sandy soil, ½ mi. e. of Yale, Payne Co., Okla. (G) or *G. M. Merrill* no. 886, Buffalo Springs, Platt National Park, Murray Co., Okla. (NY). A single specimen, *A. Ruth*, no. 739, in sandy woods, Tarrant Co., Texas (NY), shows a combination of the tawny hairs of var. *hirsuta* with general habit and involucral characters of var. *gracilenta*.

Collections from Kentucky and Tennessee have shown, growing in close populations, quite an assortment of variations. Some less hirsute plants compare well with var. *typica*, others resemble that variety though the phyllaries are shorter and more acute (as those listed for Knox Co., Tenn.). The latter condition was also noted in the few specimens from farther north in Ohio and Illinois and these are sometimes incorrectly found in herbaria under the name var. *intermedia*. Some Tennessee specimens appear to be intermediates between var. *typica* and var. *gracilenta* while others appear to have blended characters of var. *typica* and var. *hirsuta*, abundant to the west across the Mississippi. In Iowa, which is just north of the range of this latter variety, the specimens generally showed very scant pubescence and approach the intergrades between var. *hirsuta* and var. *glabrata*, the latter predominating in the northern and western plains states (S. Dakota, Nebraska, Kansas). Thus there seem to be definite geographic entities which intergrade where their ranges overlap and some of these various probable intergradations have been listed below.

Intermediates between *L. squarrosa* var. *hirsuta* and var. *glabrata*. IOWA. Co. undetermined: central Iowa, *H. H. Babcock* (US). DICKINSON Co.: upland prairie, n. of Milford, Aug. 2, 1912, *B. Shimek* (G, US). OSCEOLA Co.: prairies, near Sibley, Sept. 18, 1879, *E. L. Greene* (G); prairie, n. of Ocheyedan mound, Aug. 1912, *B. Shimek* (G, US). PLYMOUTH Co.: Akron, Sept. 1909, *Mrs. E. Bredall* (US). DECATUR Co.: prairies, Aug. 25, 1897, *T. J. Fitzpatrick* (NY, US). MISSOURI. LAFAYETTE Co.: dry prairies, Emma, Aug. 10, 1897, *C. H. Demetrio*, 116 (G). GREENE Co.: dry woods, Aug. 7, 1895, *J. W. Blankinship* (G). ARKANSAS. PULASKI Co.: roadside by Quarry Country Club, Pulaski Heights, Little Rock, Sept. 23, 1931, *D. Demaree*, 8219 (US). YELL Co.: rocky flats, Mount Nebo State Park, *D. Demaree*, Aug. 16, 1939 (no. 20060), Aug. 30, 1939 (no. 20590) (G). KANSAS. Without stated locality: 1876 *E. A. Popinoe* (US). OKLAHOMA. CREEK Co.: Sapulpa, July 30, 1894, *B. F. Bush*, 215 (G, NY, US). CADDO Co.: False Washita, between Fort Cobb & Fort Arbuckle, 1868, *E. Palmer*, 454 (US). LE FLORE Co.: in dry creek-channel, base of Rich Mt., Page, Sept. 8, 1913, *G. W. Stevens*, 2691 (G, NY, US); grassy rwy. right of way, Page, July 11, 1914, *O. W. Blakeley*, 1493 (G). PITTSBURG Co.: McAlester, July 8, 1894, *C. S. Newhall* (G).

It would seem as though from approximately the Mississippi westward the indifferently somewhat glabrous or hirsute typical *L. squarrosa* became divided into two strains, one distinctly hirsute (var. *hirsuta*), the other distinctly glabrous (var. *glabrata*, and var. *compacta*). The first two of these are easily comprehended as modifications of the squarrose-bracted var. *typica* to the east. As to the third, var. *compacta*, the transition from the condition in var. *typica* to open, erect, somewhat spreading bracts as in var. *gracilenta*, growing somewhat farther south, passed on into the Mississippi-Louisiana region where it stands out against the squarrose var. *glabrata*. It may be merely its persistence further westward in Arkansas that we recognize as var. *compacta*.

While the species *L. squarrosa* shows a range of varieties and intermediates between those varieties, it is nevertheless clearly distinguishable from *L. cylindracea* Michx., which is most closely related to it. The phyllaries of the latter are obtuse to mucronate-tipped and though the outer ones may spread slightly, are mostly appressed, not squarrose. Variation in the shape of the phyllaries from rounded at the apex, as described by Michaux, to more lanceolate ones, was probably responsible for the proposal

of Lindley's *L. intermedia*, but there is complete gradation from one state to the other within *L. cylindracea*.

That *L. squarrosa* hybridizes with other species is known from the reported finding of × *L. Ridgwayi* Standl. (see no. 6) along with plants of it and of *L. pycnostachya* of the *Pycnostachyae* series belonging to the other section *Suprago*. A second hybrid is here described, likewise with a species in the other section, but of the *Scariosae* series.

× Liatris **creditonensis,** hybr. nov. (*L. ligulistylis* × *squarrosa* var. *glabrata*), planta fruticem simulans; caulibus 12 vel plures e cormo ca. 2.5 diametro ca. 50 cm. altis basem versus glabris superne sparse pubescentibus, inflorescentiae rachi pilis albis adpressis strigosa; foliis glabris, superioribus ad bracteas capitula inferiora duplo superantibus capitula superiora aequantes reductis; inflorescentia racemosa; capitulis 40–50-floris subturbinatis 1.6 cm. longis 1.8 cm. latis, phyllariis laxe erectis oblongis apice subarcuato acuto fere omnino herbaceis marginibus scariosis angustis leviter revolutis, exterioribus ca. 5 mm. longis 3 mm. latis, medianis interioribusque ca. 1 cm. longis 5 mm. latis subacutis; corollis ca. 9 mm. longis pallide purpureis, tubo intus glabro, lobis pagina interiore conspicue pilosis; stigmatibus albis; achaeniis 4–5 mm. longis; pappo ca. 6 mm. longo manifeste barbellato.—The type appeared in the garden at Crediton, Huron Co., Ontario, in the summer of 1931 (G).

A single plant of this hybrid appeared in a plot among plants of *L. squarrosa* var. *glabrata*, seeds of which had been collected Oct. 4, 1927, from a high cliff, n. w. of Royal, Antelope Co., Nebraska by Dr. Wernicke, and were received through Prof. R. A. Harper. Growing next at the time were plants of *L. ligulistylis* collected near Erskine, Red Lake Co., Minn. by the writer in 1929. The plant resembled the former species in producing a number of stems with a raceme of ca. 20 uniformly sized heads (without an unusually large terminal one), in the glabrous leaves and their gradual diminution so that they projected as bracts subtending the heads through at least two-thirds of the length of the inflorescence and in the pilosity on the inside of the corolla-lobes. It resembled L. *ligulistylis* in the pubescence of the rachis of the inflorescence, in the many-flowered (40–50) heads, in the involucre of loose erect phyllaries and in the barbellate rather than plumose pappus. It showed intermediate characters in the shape and width of the leaves, in the acute but

broader phyllaries that were almost wholly herbaceous except for the narrow margins but on the whole was a true intermediate between the two species.

As the plant was under cultivation, it was possible to collect seeds and 15 varied seedlings gave proof of their viability. Of the progeny two plants appeared almost identical with the parent and seven others varied only slightly in the width of leaves or phyllaries from it. Of the other seedlings two were very like the parental *L. squarrosa* var. *glabrata:* three were more like it than *L. ligulistylis* in the pointed phyllaries and one other in having narrowly linear leaves. All of the seedlings had hairs within the corolla-lobes, thus showing a much stronger relationship to *L. squarrosa* var. *glabrata.*

Excluded Names and Species

Liatris amplexicaulis Raf. New Fl. N. Amer. iv. 76 (1838)—probably *Trilisa odoratissima.*

Liatris baicalensis Adams in Mem. Soc. Nat. Mosc. v. 115 (1817)—obviously not a *Liatris.*

Liatris bellidifolia Michx. Fl. Bor.-Amer. ii. 92 (1803) = *Carphephorus bellidifolius.*

Liatris brasiliensis Gardn. Hook. London Jour. Bot. v. 461 (1846) = *Leptoclinium brasiliense* Benth. & Hook. Gen. Plant. ii. 244 (1873).

Liatris cordata D. Don ex Royle Illust. Bot. Himal. 247 (1835)—nomen nudum.

Liatris cordata Royle ex C. B. Clarke, Compos. Indicae, 247 (1876) = *Ainsliaea aptera.*

Liatris corymbosa Nutt. Gen. Amer. ii. 132 (1818) = *Carphephorus corymbosus.*

Liatris fruticosa Nutt. Amer. Jour. Sci. v. 299 (1822) = *Garberia fruticosa.*

Liatris lanata Spreng. ex. DC. Prodr. vi. 540 (1837) obviously not a *Liatris.*

Liatris latifolia Don, Prodr. Fl. Nep. 169 (1825) obviously not a *Liatris.*

Liatris lobelioides Wall. ex. C. B. Clarke, Compos. Indicae, 246 (1876) = *Ainsliaea pteropoda.*

Liatris odoratissima Willd. Sp. Pl. iii. 1637 (1803) = *Trilisa odoratissima.*

Liatris oppositifolia Nutt. in Amer. Jour. Sci. v. 299 (1822) = *Eupatorium ivaefolium.*

Liatris paniculata Michx. Fl. Bor. Amer. ii. 93 (1803) = *Trilisa paniculata.*

Liatris squamosa Nutt. Jour. Acad. Nat. Sci. Phil. vii. 73 (1834) = *Carphephorus Pseudo-Liatris.*

Liatris tomentosa Michx. Fl. Bor. Amer. ii. 93 (1803) = *Carphephorus tomentosus.*

Liatris trichotoma Gardn. Hook. London Jour. Bot. vi. 435 (1847) = *Leptoclinium trichotomum* Benth. ex. Baker in Martius Fl. Brasil. vi. (2) 272 (1875–6).

Liatris umbellata Bertol. Misc. Bot. v. 13, t. 4 (1846) = *Vernonia angustifolia.*

Liatris Walteri Ell. Sk. ii. 285 (1821–24) = *Carphephorus tomentosus* var. *Walteri* (Ell.) Fern.

Doubtful Species

Liatris alata (Nelson) K. Sch. Just, Bot. Jahresb. xxxix. 569 (1903)—with "reflected lower leaves, long foliar-bracted spike and alate bracts of the involucre"; the type of the proposed species (Aug. 1895, J. H. Kimmons, Creek Nation, Indian Territory of Oklahoma (Rocky Mt. Herb.) "still represented only by the type number from Oklahoma."[1]

Liatris botrys Raf. New Fl. N. Amer. iv. 76 (1838)—remains a question.

Liatris heterophylla R. Br. in Ait. Hort. Kew. ed. 2 iv. 503 (1812)—Though the type specimen has not been seen, from examination of a photograph of it and the phyllaries of a head of it in a small packet at the Gray Herbarium, this still seems a doubtful and rare species (see discussion no. 17).

Liatris hirsutissima Poir. ex Steudel, Nom. Bot. ed. 2, ii. 40 (1841)—published in synonymy of *Liatris pycnostachya* Michx.

Liatris linaria Raf. Fl. Ludov. 61. (1817)—descr. *Cynarocephale* élégante sans épines Rob. Voy. Louis. iii. 429 (1807). Probably *L. pycnostachya* Michx.

Laciniaria platylepis Small, Bull. Torr. Bot. Club xxvii. 281 (1900); Fl. S. E. U. S. 1174 (1903).—Type specimen of Hale from Louisiana (N. Y.) said not to be like *acidota* because of inner rounded bracts.

Liatris picta Barton ex Greene Herb.—Published in synonymy of *L. spicata* L. in DC. Prodr. v.[1] 130 (1836). The specimen has not been located.[2]

Liatris pumila Lodd. Cab. t. 147 (1817)—Insufficient description to identify; by plate probably *L. spicata* (L.) Willd. *Laciniaria spicata* var. *pumila* Porter, Mem. Torr. Bot. Club v. 314 (1894).

Liatris rigida Raf. New Fl. Amer. iv. 76 (1838)—insufficient description.

[1] By private communication from Prof. A. Nelson.

[2] By private communication from Dr. F. W. Pennell and Mr. C. A. Weatherby.

Laciniaria scariosa var. *trilisioides* Farwell, Rep. Mich. Acad. Sci. xvii. 170–171 (1916)—*Liatris novae-angliae* var. *Nieuwlandii* f. *trilisioides* (Farwell) Shinners, Amer. Mid. Nat. xxix. 31 (1943)—was reported as a sweet-scented form, but the type has not been available.

Laciniaria serotina Greene, Pitt. iv. 315 (1901)—probably an intermediate between *Liatris spicata* (L.) Willd. and *L. pycnostachya* Michx. (See discussion no. 1).

Liatris turbinata Sweet, Hort. Brit. ed. i. 220 (1836) = nomen.

Liatris uniflora Raf. New Fl. Amer. iv. 76 (1836)—by description and region of collection may very well apply to specimens of *L. squarrosa* (L.) Willd. var. *gracilenta*, bearing one head only.

Liatris varia Herb. Banks, Pursh, Fl. ii. 508 (1814)—published in synonymy of *L. heterophylla* R. Br.

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IMPATIENS ROYLEI VERSUS I. GLANDULIFERA

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The handsome Himalayan species of *Impatiens* commonly known as *I. Roylei* has now escaped from cultivation and established itself so successfully at so many localities, from Nova Scotia to Washington and British Columbia, that it has earned a place in our manuals. Its correct name therefore becomes a matter of some importance.

I. Roylei is a substitute name given by Walpers, Repert. i. 475 (1842), to *I. glandulifera* Royle because of *I. glandulifera* Arnott, which Walpers either supposed to be earlier or, at a time when priority was more lightly regarded than at present, thought preferable. Since the title-page of Royle's Illustrations bears the date 1839 and that of the first volume of the Companion to the Botanical Magazine, in which Arnott's species was published, 1835, Walpers may well have thought he was observing strict priority. In any case, his name was adopted by Sir Joseph Hooker in the Flora of British India and the Epitome of the British Indian Species of Impatiens, and by nearly everyone else who has had occasion to refer to the species, though *I. glandulifera* has persisted to some extent in horticultural literature and has been regularly cited as a synonym by L. H. Bailey (e. g. in Hortus Second).

In 1900, however, in a note which seems to have been generally overlooked (Journ. Bot. xxxviii. 87–88), Hiern pointed out that both Royle's work and the Companion were published in parts and that the part of the former which contains *I. glandulifera* was issued more than a year before the part of the Companion in which Arnott's homonym appeared. Sprague in 1933 (Kew Bull. 362–364; 378–390) went into the matter in detail, establishing dates of issue for all parts of both works and confirming Hiern's conclusions. They were further confirmed by Stearn in 1943 (Journ. Arnold Arb. xxiv. 484–487) from a copy of Royle's Illustrations still in the original fascicles which he discovered.

The correct name for the species is, then, *I. glandulifera* Royle. Bibliography (the dates for Royle and Arnott taken from Sprague) is as follows.

IMPATIENS GLANDULIFERA Royle, Ill. Bot. Himalaya Mts. t. 28, fig. 2, plate without analyses of flower, (March, 1834) and p. 151 (Jan., 1835); Lindl. in Bot. Reg. xxvi. t. 22 (1840), as *glanduligera;* Hook. in Bot. Mag. t. 4020 (1843), as *glanduligera;* Sprague in Kew Bull. 1933: 386. Not *I. glandulifera* Arn. in Comp. Bot. Mag. i. 322 (June, 1836).—*I. Roylei* Walp. Repert. i. 475 (1842); Hook. f. & Thomps. in Journ. Linn. Soc. iv. 127 (1860); Hook. f. Fl. Brit. India, i. 468 (1872) and in Rec. Bot. Survey India, iv. 7 (1904); E. Loew in Engl. Bot. Jahrb. xiv. 167, t. 1, 2 (1892); Bailey, Standard Cycl. Hort. 1644, fig. 1954 (1915); Toppin in Kew Bull. 1920: 347.

The flowers of *I. glandulifera* are typically, except for the short green spur, of a uniform dark magenta-red without spots, and, with a single exception, all the American material I have seen is of this typical form, or at least indistinguishable in the dried state. At St. John, New Brunswick, however, where the species crowds several small areas of moist waste ground, many individuals have pale pink corollas with brownish or reddish spots on the sac, yellowish spur and a narrow green band running along the upper side of the sac to the spur. This is apparently *I. Roylei* var. *pallidiflora* Hook. f. in Bot. Mag. t. 7647 (1899). Since Hooker gives no differential characters except color of flower and size of plant for his variety and since the St. John material seems to show no others, this may appropriately be treated as a color-form and, at some risk of repeating a combination already made in recent European literature, be called

I. GLANDULIFERA Royle, forma **pallidiflora** (Hook. f.) n. comb. *I. Roylei* var. *pallidiflora* Hook. f. in Bot. Mag. t. 7647 (1899).

Hegi, Ill. Fl. Mittel-Eur. v. 314 (1924), describes a pure albino as *I. Roylei* forma *albida* Hort. This is very likely the same as *I. Roylei* var. *candida* (Lindl.) Hook. f. Fl. Brit. India, i. 469 (1872); *I. candida* Lindl. in Bot. Reg. xxvi. Misc. Not. 85 (1840) and xxvii. t. 20 (1841). I saw no pure white flowers at St. John.[1]

GRAY HERBARIUM.

[1] Since the above was in type I have, through the kindness of Prof. G. N. Jones, seen further specimens of two collections by him—Mukilteo, Snohomish Co., Washington, Aug. 4, 1937, no. 10545 and Port Moody, British Columbia, Aug. 14, 1935, s. n. These show that the plants at both the above stations were of forma *pallidiflora*. I have seen no other western material.

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ERRATA

Page 14, line 28; *for* 1006 *read* 1000.
Page 38, line 5; *for* transfer *read* transfers.
Page 44, line 23; *for* aments, with *read* aments with.
Page 142, line 1; *for* S. U. Se. *read* Se. U. S.
Page 173, line 23; *for* Willd. *read* Michx.
Page 254, line 4; *for* 16028 *read* 10028.
Page 262, line 31; *for* Jones *read* Jonas.

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